

NEW  
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PRESS

# THE CARTOON HISTORY OF THE

# UNIVERSE

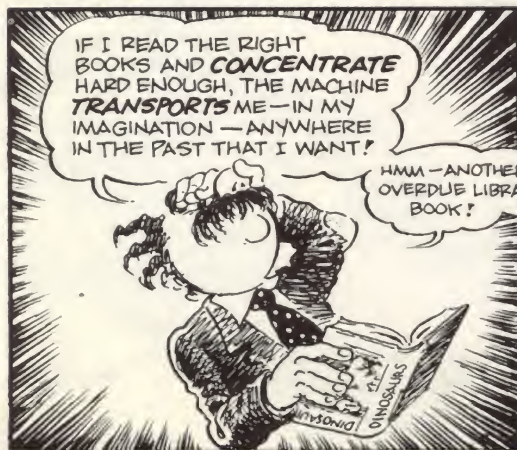
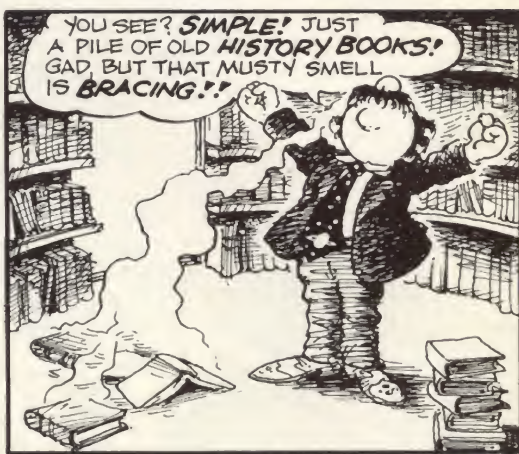
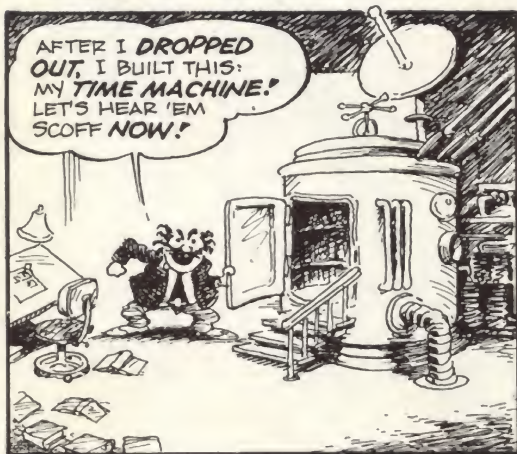
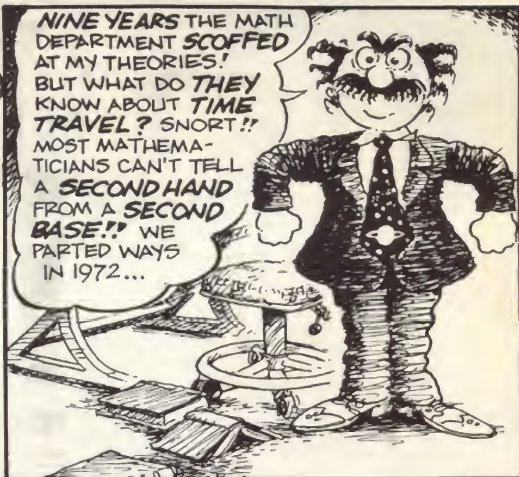
\$1.00

VOLUME 1  
THE EVOLUTION  
OF  
EVERYTHING  
INCLUDING  
SEX!!





# INTRODUCTION.

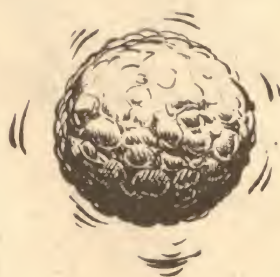


THE CARTOON HISTORY OF THE UNIVERSE

VOLUME I.

# THE EVOLUTION OF EVERYTHING

by LARRY GONICK



**B**EFORE TIME BEGAN, THE ENTIRE UNIVERSE WAS PRESSED TOGETHER IN ONE HOT LUMP. THEN CAME...

SGT MARK E. DAINEN





# THE BIG



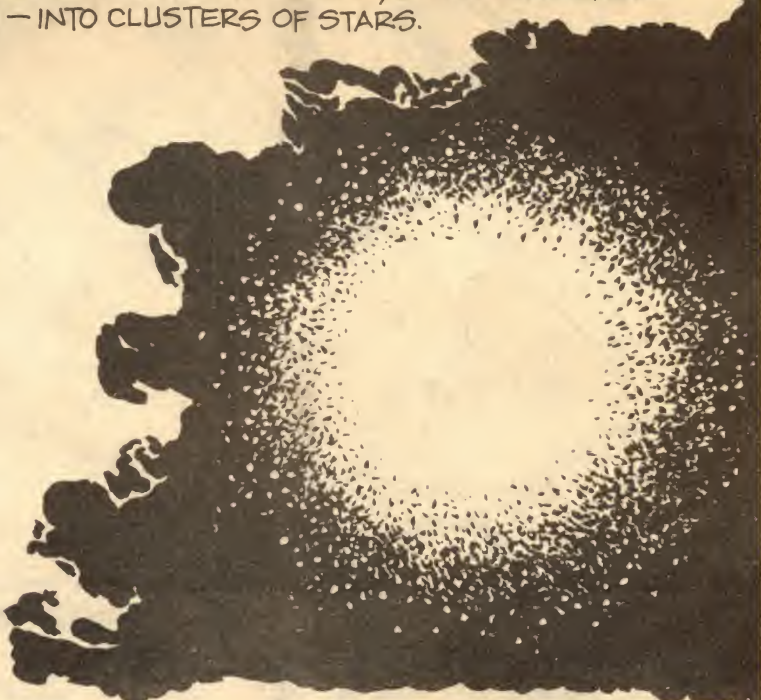


**BANG**

IN THE FIRST  
30 MINUTES, **ALL**  
THE ORIGINAL  
HYDROGEN AND  
HELIUM WERE  
FORMED.



AFTER SEVERAL MILLION YEARS, THE EXPANDING GASES CALMED DOWN ENOUGH TO ACCUMULATE INTO CLOUDS, WHICH CONDENSED — HEATING UP AGAIN — INTO CLUSTERS OF STARS.



IN THE STELLAR FURNACES  
HYDROGEN AND HELIUM  
**FUSED** TOGETHER, CREATING  
THE MIDDLE-WEIGHT  
ELEMENTS, LIKE CARBON,  
OXYGEN, AND IRON...


AS THESE FIRST STARS GREW OLD,  
SOME EXPLODED INTO **SUPERNOVAS**.  
THE HEAVIEST ELEMENTS, LIKE GOLD  
AND URANIUM, WERE FORMED IN  
THE INTENSE HEAT AND BLOWN  
INTO SPACE.








EIGHT BILLION YEARS AFTER THE BIG BANG, THE UNIVERSE LOOKED MUCH THE SAME AS IT DOES TODAY: GREAT GALAXIES OF STARS, GAS, AND DUST MOVING APART THROUGH EMPTY SPACE. IT WAS THEN THAT OUR **SUN** MADE THE SCENE!!



THE BIG BANG IS ONLY THE LATEST AND MOST RESPECTABLE THEORY OF THE ORIGIN OF THE UNIVERSE. YEARS AGO, BEFORE ACCURATE METHODS OF OBSERVATION, ALL SORTS OF IDEAS PREVAILED.

THE SNAKE MATED WITH THE DUCK, SEE, AND PRODUCED THE COSMIC EGG!!


AAH— TELL IT TO THE COMMONERS!!



MODERN THEORIES HAVE MORE TO EXPLAIN, SUCH AS WHY THE GALAXIES ARE RECEDING. FOR INSTANCE, THERE'S THE LITTLE-KNOWN **CONSPIRACY** THEORY (VERY MODERN):

THE GALAXIES ARE FLEEING BECAUSE THEY **HATE US!**

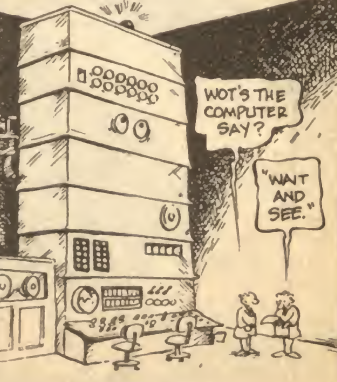
BETTER GOIN' OUT THAN COMIN' IN!



NOWADAYS, NEARLY EVERYONE ACCEPTS THAT THE UNIVERSE STARTED WITH A BANG, BUT NO ONE CAN FIGURE OUT HOW IT'S GOING TO END!

WOT'S THE COMPUTER SAY?

"WAIT AND SEE."



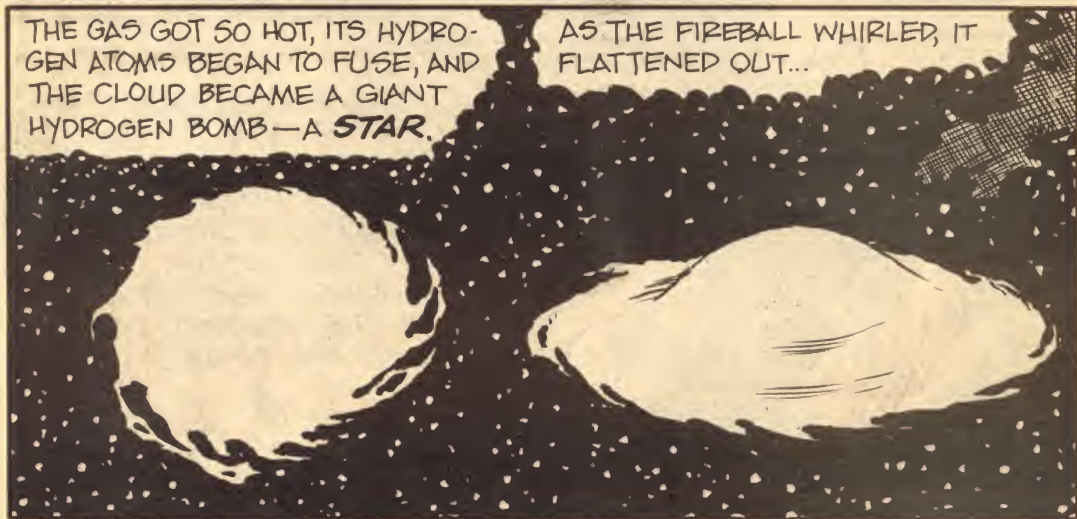


AT THE EDGE OF A SPIRAL GALAXY CALLED *THE MILKY WAY*, A CLOUD OF GAS BEGAN TO COLLAPSE. PULLED TOGETHER BY THE FORCE OF ITS OWN GRAVITY, THE COMPRESSED MASS HEATED UP, SPINNING FASTER AND FASTER...

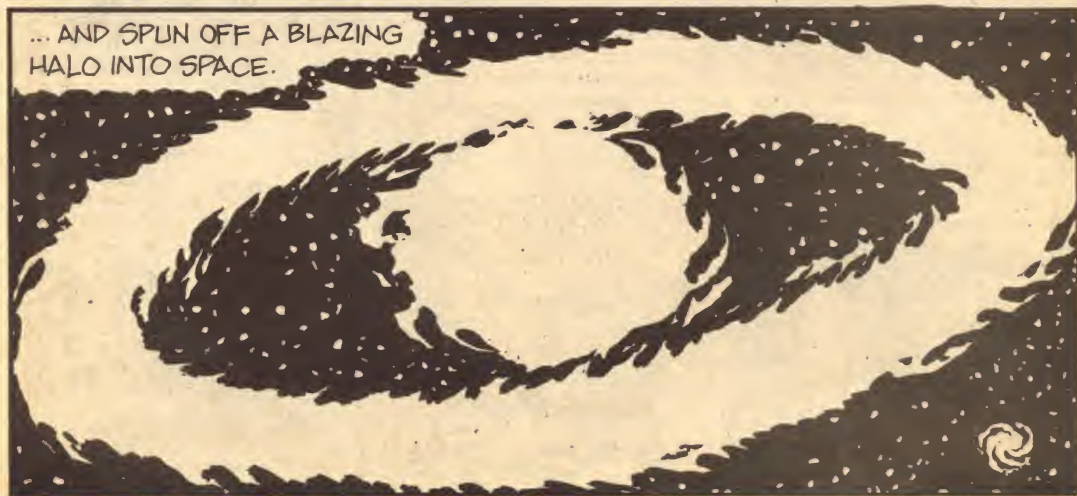


THE GAS GOT SO HOT, ITS HYDROGEN ATOMS BEGAN TO FUSE, AND THE CLOUD BECAME A GIANT HYDROGEN BOMB—A *STAR*.

AS THE FIREBALL WHIRLED, IT FLATTENED OUT...



... AND SPUN OFF A BLAZING HALO INTO SPACE.





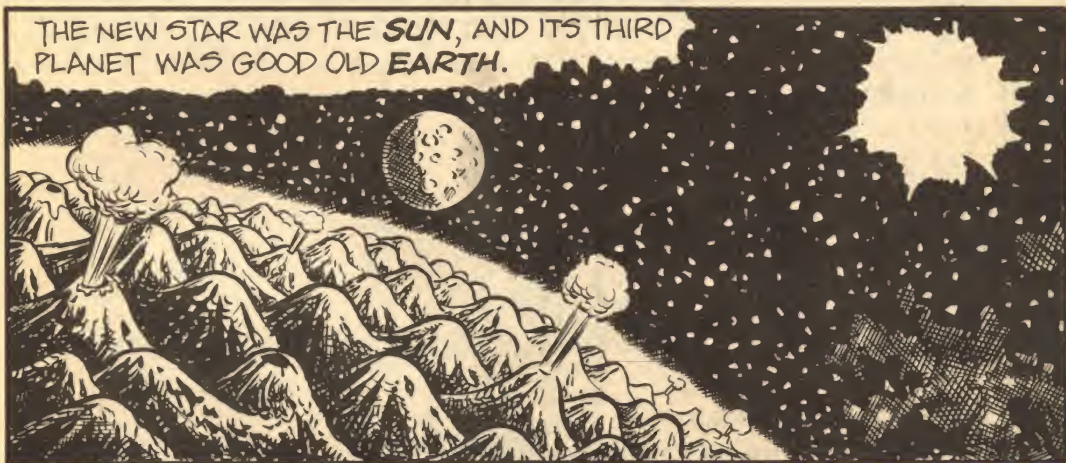
MOST OF THE CAST-OFF MASS ESCAPED FOREVER, BUT SOME REMAINED IN ORBIT AROUND THE STAR.



OVER THE NEXT FEW MILLION YEARS, BITS OF THIS "SPACE JUNK" STUCK TOGETHER, UNTIL IT HAD ACCUMULATED INTO NINE PLANETS, PLUS ASSORTED MOONS, ASTEROIDS, AND COMETS.



THE NEW STAR WAS THE **SUN**, AND ITS THIRD PLANET WAS GOOD OLD **EARTH**.



THE SUN ISN'T THE ONLY STAR IN THE UNIVERSE WITH PLANETS. IN THE MILKY WAY ALONE, SCIENTISTS ESTIMATE, AT LEAST A **BILLION** STARS HAVE PLANETS CAPABLE OF SUPPORTING LIFE.



SOME SCIENTISTS EVEN SAY THAT LIFE OUT THERE MUST LOOK LIKE US ?? (GUESS WHAT THEY SAY ON ALPHA CENTAURI.)

THEY'RE JUST LIKE US, I TELL YOU!

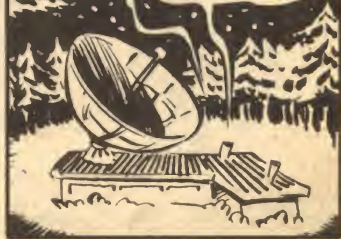
I HOPE SO!



FOR SOME TIME NOW, EARTHLINGS HAVE BEEN BEAMING SIGNALS TO OUTER SPACE, BUT SO FAR NO REPLY.

SEE ? JUST LIKE HUMANS!

YEAH. THEY DON'T RETURN THEIR CALLS!



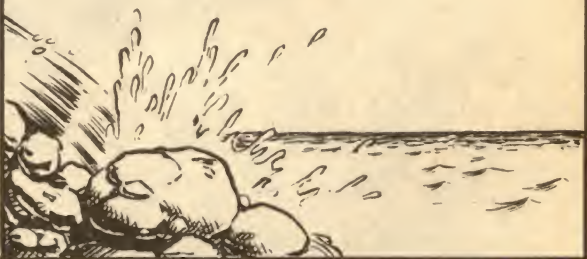
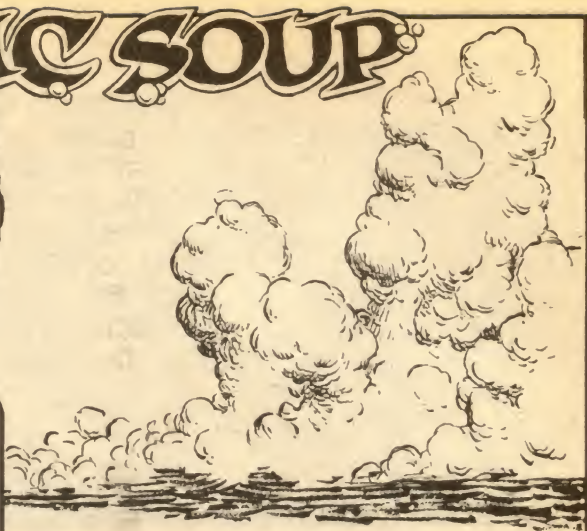


# ORGANIC SOUP

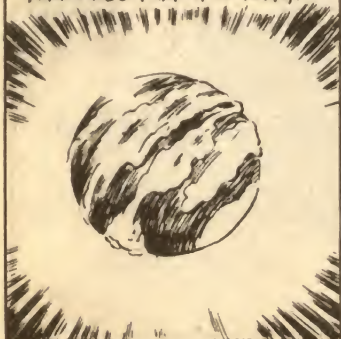


**A**S THE EARTH COOLED, ITS SURFACE SCUM SOLIDIFIED INTO A THIN CRUST—THE **CONTINENTS**. BENEATH LAY A THICK MANTLE OF DENSER ROCK, AND AT THE CENTER A CORE OF IRON.

AS THE CRUST HARDENED, IT LET OFF JETS OF BOILING **WATER**—THE ALL-IMPORTANT MEDIUM OF **LIFE**. LUCKILY FOR US, THE ATMOSPHERE, TOO, WAS MAINLY COMPOSED OF LIFE'S RAW MATERIALS: **METHANE** AND **AMMONIA**.



SINCE IT'S IN THE NATURE OF RADIO-ACTIVE ELEMENTS TO DECAY INTO STABLE ONES, THE EARTH MUST HAVE BEEN FAR MORE RADIOACTIVE 4 BILLION YEARS AGO THAN IT IS TODAY.



THIS MEANS GEOLOGISTS CAN **DATE ROCKS** BY COMPARING RELATIVE AMOUNTS OF (FOR INSTANCE) URANIUM AND LEAD. THERE ARE LESS EFFECTIVE WAYS OF DATING ROCKS, TOO...

WELL, THEN HOW ABOUT A **WEEK** FROM SATURDAY?



ONE SURPRISING RESULT OF RADIO-DATING IS THAT THE EARLIEST EVIDENCE OF LIFE (3.5 BILLION YEARS OLD) IS ALMOST AS OLD AS THE VERY OLDEST ROCKS (3.7 BILLION YEARS). APPARENTLY, RADIATION DIDN'T FAZE EARLY LIFE FORMS!!

YOU CLOSE YER EYES FER A HUNDRED MILLION YEARS, AND THE NEXT THING YOU KNOW, YER COVERED WITH GREEN SLIME!!





A RECIPE FOR LIFE:  
SHOOT **LIGHTNING** THROUGH A  
CLOUD OF METHANE AND AMMONIA.  
LET THE RESULTING CHEMICALS FALL  
WITH THE RAIN AND ACCUMULATE IN  
THICK PUDDLES OF "**ORGANIC SOUP.**"  
SIMMER FOR AT LEAST A HUNDRED MILLION  
YEARS. EVENTUALLY, YOU WILL HAVE PRODUCED  
A MOLECULE WITH THE ABILITY TO **REPRODUCE.**  
IT WILL TAKE CARE OF THE REST!!







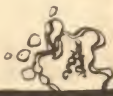
HUNGRY

USING THE COMPLEX INGREDIENTS OF THE ORGANIC SOUP, THIS STRANGE MOLECULE, CALLED A **NUCLEIC ACID**, BEGAN MAKING COPIES OF ITSELF. ALL THE COPIES COPIED, TOO, AND SOON THE BEST STUFF IN THE SOUP WAS EATEN UP!

MINE!

MINE!

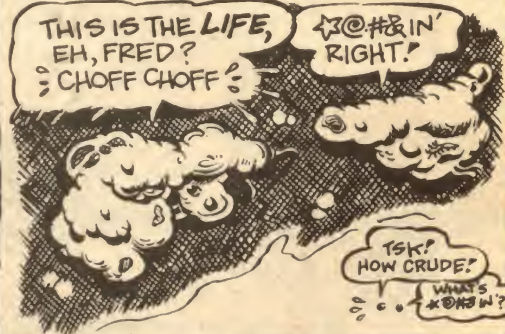
THE NUCLEIC ACID RESPONDED BY ORGANIZING LITTLE CHEMICAL FACTORIES, WHICH COULD CONVERT SIMPLER FOODS INTO THE MATERIALS NEEDED FOR REPRODUCTION.



SOME OF THESE WORKED BETTER THAN OTHERS, AND SO, AFTER EONS OF TRIAL AND ERROR, TRUE LIFE EVOLVED: THE FIRST CRUDE **CELLS**.

THIS IS THE **LIFE**,  
EH, FRED?  
CHOFF CHOFF!

☆@#&'N'  
RIGHT!



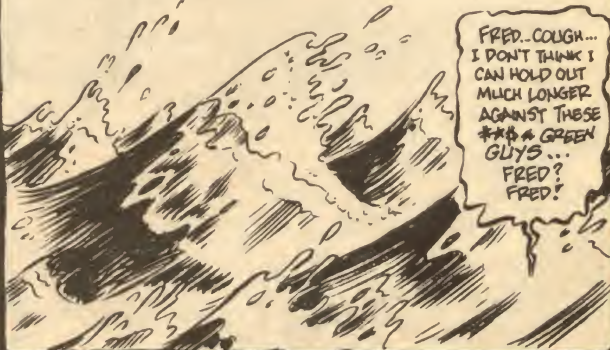
TSK!  
HOW CRUDE?

WHAT'S  
\*@#&'N'?



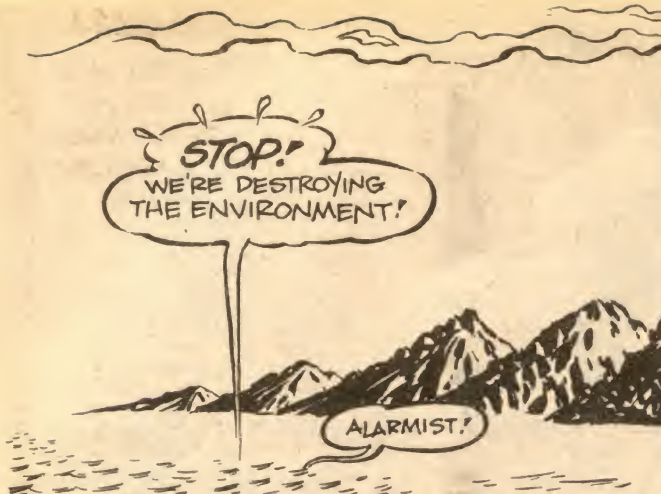
ONE DAY MORE THAN 3 BILLION YEARS AGO, SOME LUCKY CELL DISCOVERED **CHLOROPHYLL**. WHEN EXPOSED TO THE SUN, THIS GREEN CHEMICAL HELPED BUILD TISSUE OUT OF THE SIMPLEST POSSIBLE FOODS: **CARBON DIOXIDE** AND **WATER**. HAVING AN ALMOST UNLIMITED LARDER, THE CELL AND ITS CHLOROPHYLL-BEARING DESCENDANTS DID WELL.

THEY WERE THE BLUE-GREEN ALGAE—THE FIRST **PLANTS**.



FRED... COUGH...  
I DON'T THINK I  
CAN HOLD OUT  
MUCH LONGER  
AGAINST THESE  
\*@#&'N' GREEN  
GUYS...  
FRED?  
FRED!






**STOP!**  
WE'RE DESTROYING  
THE ENVIRONMENT!

ALARMIST!

AS THE ALGAE ATE,  
THEY GAVE OFF THE  
FIRST PURE **OXYGEN**.  
OXYGEN RUSTED METALS,  
TURNED AMMONIA AND  
METHANE TO NITROGEN  
AND CARBON DIOXIDE,  
AND FORMED AN  
**OZONE** LAYER IN THE  
UPPER ATMOSPHERE  
WHICH SCREENED OUT  
COSMIC RAYS...


THE PLANTS **PAID** FOR THIS POLLUTION: NEW CELLS EVOLVED WHICH  
**BREATHED OXYGEN** AND **ATE PLANTS** — THE FIRST **ANIMALS!**!




**YUM!?**

**YOW!?**

PRETTY SOON  
THESE ANIMALS  
WILL BE EATING  
EACH OTHER!



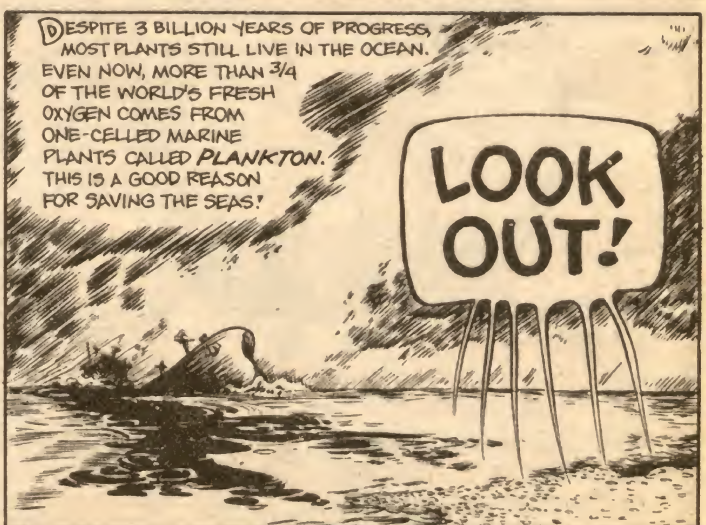
THE FIRST FREE  
OXYGEN CAME FROM  
PLANTS, AND TODAY  
WE STILL RELY ON  
PLANTS TO MAINTAIN  
THE OXYGEN CONTENT OF THE  
AIR WE BREATHE.



A ROSE DOES  
MORE FOR YOUR  
NOSE THAN YOU  
MIGHT SUPPOSE!

AND VICE  
VERSA!

DESPITE 3 BILLION YEARS OF PROGRESS,  
MOST PLANTS STILL LIVE IN THE OCEAN.  
EVEN NOW, MORE THAN 3/4  
OF THE WORLD'S FRESH  
OXYGEN COMES FROM  
ONE-CELLED MARINE  
PLANTS CALLED **PLANKTON**.  
THIS IS A GOOD REASON  
FOR SAVING THE SEAS!



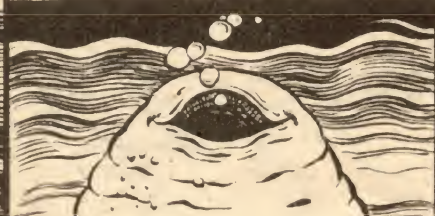
**LOOK  
OUT!**



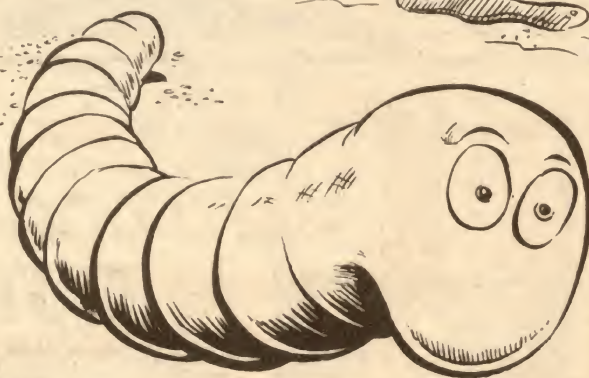
FOR SELF-PROTECTION, BOTH  
PLANT AND ANIMAL CELLS  
CLUSTERED TOGETHER  
IN COLONIES...



FOR EFFICIENCY, SOME CELLS  
BEGAN **SPECIALIZING** IN  
EATING, DIGESTION, SEEING,  
COORDINATION, OR REPRODUCTION



BEFORE LONG, THE WORLD  
HAD **WORMS!** WITH  
**BRAINS!?**





# A DIGRESSION ON

# EVOLUTION



SINCE THE TIME OF THE ALGAE, ORGANISMS HAVE COMPETED FOR RESOURCES, BUT DON'T GET THE IDEA THAT EVOLUTION IS A SIMPLE **WAR** OF ALL AGAINST ALL, IN WHICH THE WEAK PERISH AND ONLY THE STRONG SURVIVE! **NO!!**



FROM THE VERY BEGINNING OF LIFE, ONE OF THE MOST SUCCESSFUL SURVIVAL STRATEGIES HAS BEEN **CO-OPERATION!!**



FIRST OF ALL, DIFFERENT STRANDS OF NUCLEIC ACID HAD TO TEAM UP INTO **CHROMOSOMES** TO STORE ALL THE INFORMATION NEEDED TO RUN A LIVING CELL.



IT IS BELIEVED THAT MODERN CELLS, WHICH ARE HIGHLY COMPLEX, EVOLVED FROM **CO-OPERATIVE ARRANGEMENTS** AMONG EARLIER, SIMPLER CELLS...

HOWZIT GOIN' AT YOUR END OF THE PROTOPLASM?

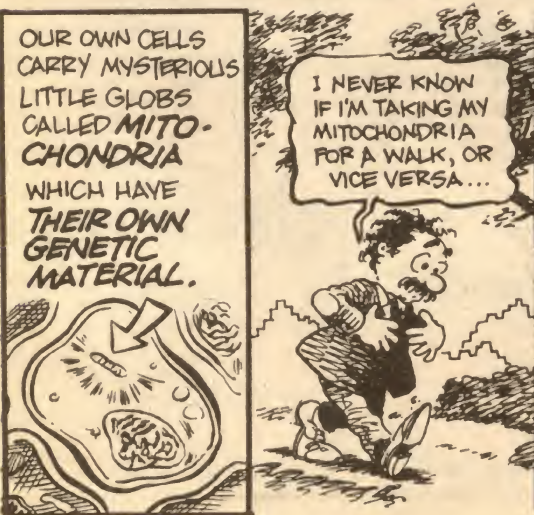
I'VE BEEN WORRIED ABOUT LOSING MY **INDIVIDUALITY**.

HEY, IT'S TOO LATE NOW, JACK!



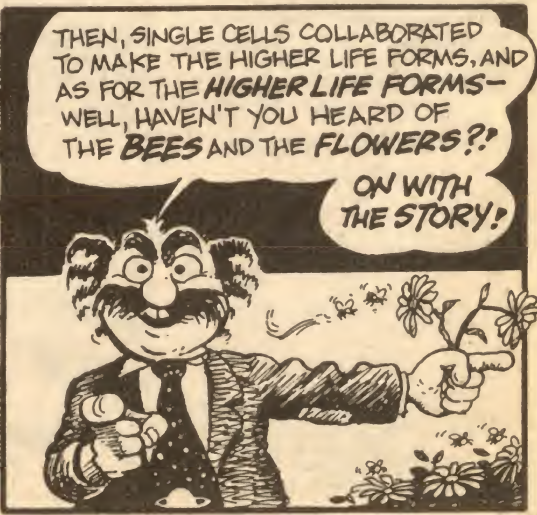
OUR OWN CELLS CARRY MYSTERIOUS LITTLE GLOBS CALLED **MITOCHONDRIA** WHICH HAVE **THEIR OWN GENETIC MATERIAL**.

I NEVER KNOW IF I'M TAKING MY MITOCHONDRIA FOR A WALK, OR VICE VERSA...



THEN, SINGLE CELLS COLLABORATED TO MAKE THE HIGHER LIFE FORMS, AND AS FOR THE **HIGHER LIFE FORMS**—WELL, HAVEN'T YOU HEARD OF THE **BEEES** AND THE **FLOWERS**?!

**ON WITH THE STORY!**





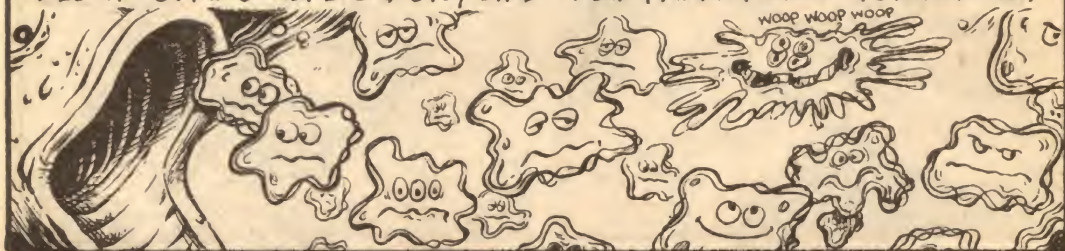
# THE ORIGIN OF

# SEX

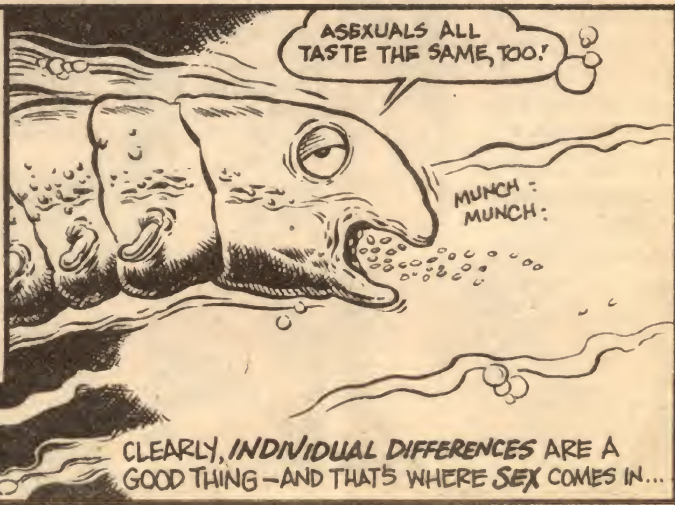
FOR BILLIONS OF YEARS,  
ALL LIFE REPRODUCED  
**ASEXUALLY**, BY SIMPLY  
DIVIDING IN HALF.



ALL OFFSPRING WERE EXACTLY LIKE THEIR PARENT (EXCEPT FOR MUTANTS).



NOW SUPPOSE THE **ENVIRONMENT CHANGED**: SAY A NEW PREDATOR CAME ALONG. OUR ASEXYALS, BEING ALL ALIKE, WERE ALL **EQUALLY LIABLE TO BE KILLED**. IF A FEW OF THEM HAD BEEN TOUGHER OR FASTER, THEY MIGHT HAVE **ESCAPED** TO PROPAGATE THE SPECIES.



CLEARLY, **INDIVIDUAL DIFFERENCES** ARE A GOOD THING - AND THAT'S WHERE **SEX** COMES IN...



**S**EX IS A **GENETIC** WAY OF CREATING AND TRANSMITTING INDIVIDUAL DIFFERENCES WITHIN A POPULATION...



ALSO A WAY TO SELL COMIC BOOKS!

**SEX** HAS BEEN AROUND A LOT LONGER THAN **SEXUAL REPRODUCTION**— EVER SINCE THE FIRST TWO STRANDS OF NUCLEIC ACID GOT **CLOSE** ENOUGH TO FORM A CHROMOSOME AND SOMETHING **DIFFERENT**.

EVER TAKE ACID BEFORE?

NEVER, MY DARLING!

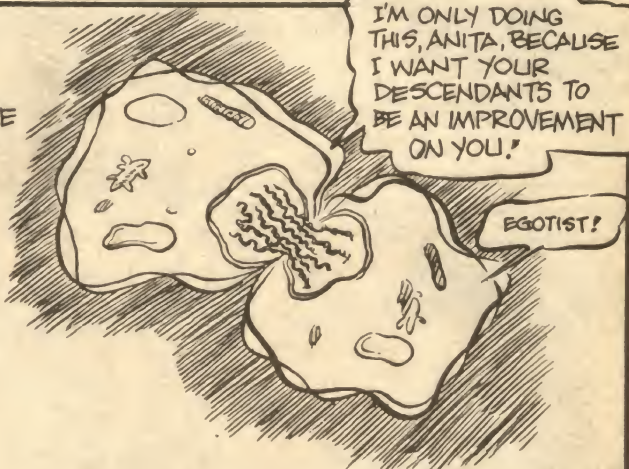


IN FACT, SEX ORIGINALLY WAS JUST THE **OPPOSITE** OF REPRODUCTION.

**REPRODUCTION** MEANT ONE CELL SPLITTING IN TWO, BUT **SEX** MEANT TWO CELLS **JOINING** FOR A WHILE TO PLAY WITH EACH OTHERS' **GENES**. SEX **DELAYED** REPRODUCTION!!

I'M ONLY DOING THIS, ANITA, BECAUSE I WANT YOUR DESCENDANTS TO BE AN IMPROVEMENT ON YOU!

EGOTIST!



**B**ACTERIA, TINIER THAN THE SMALLEST CELL, ARE THEMSELVES LIKE A FOOTNOTE TO LIFE. YET SCIENTISTS HAVE RECENTLY DISCOVERED THAT BACTERIA, TOO, CAN HAVE SEX.

THE EXPERIMENT: TWO STRAINS OF THE GONORRHEA-CAUSING BACTERIUM **GNONOCOCCUS**, ONE RESISTANT TO PENICILLIN AND THE OTHER NOT, WERE COMBINED IN A DISH.

ALL RIGHT!

AFTER A TIME, **ALL** THE GONOCOCCI COULD RESIST PENICILLIN. IT TURNED OUT THE BACTERIA HAD PAIRED OFF, AND THE RESISTANT ONES HAD **MODIFIED THE GENES** OF THE OTHERS— A SMALL BUT SOPHISTICATED ACT OF SEX!!

MY GOD! IT'S AN ORGY!!

BUT NOT TONIGHT, OK? I HAVE A VIRUS!





# SEXUAL REPRODUCTION,

THE REGULAR USE OF SEX IN THE REPRODUCTIVE PROCESS, BEGAN AS A **PERVERSION** OF ORDINARY REPRODUCTION. WHO KNOWS WHY?



I WAS UNDER A LOT OF STRESS, SEE, AND...

SOME CELL, INSTEAD OF DIVIDING INTO **TWO** REGULAR CELLS, SPLIT INTO **FOUR** **HALF-CELLS** CALLED **GAMETES**.



SINCE THESE **GAMETES** HAD ONLY **HALF** A SET OF **GENES**, THEY EXPERIENCED —

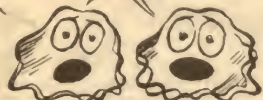


THE URGE TO MERGE!!

GOOSH!

AND THAT WAS IT.

THAT WAS IT?



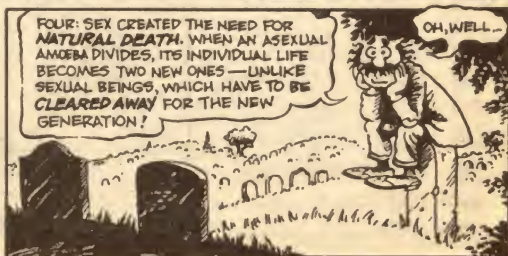
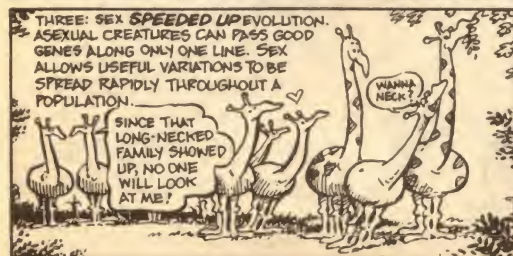
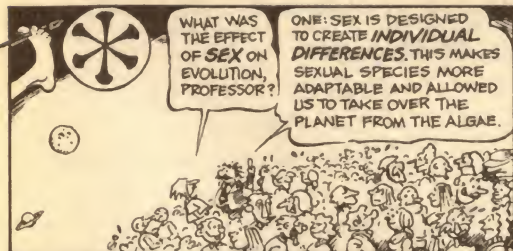
YES, BY SPLITTING INTO GAMETES AND RECOMBINING, THE CELL HAD FOUND A WAY TO **REPRODUCE** AND **SHUFFLE ITS GENES** AT THE SAME TIME.

WITH **TWO** PARENTS, IT WORKED EVEN BETTER, AS THE OFFSPRING COMBINED FEATURES OF BOTH:





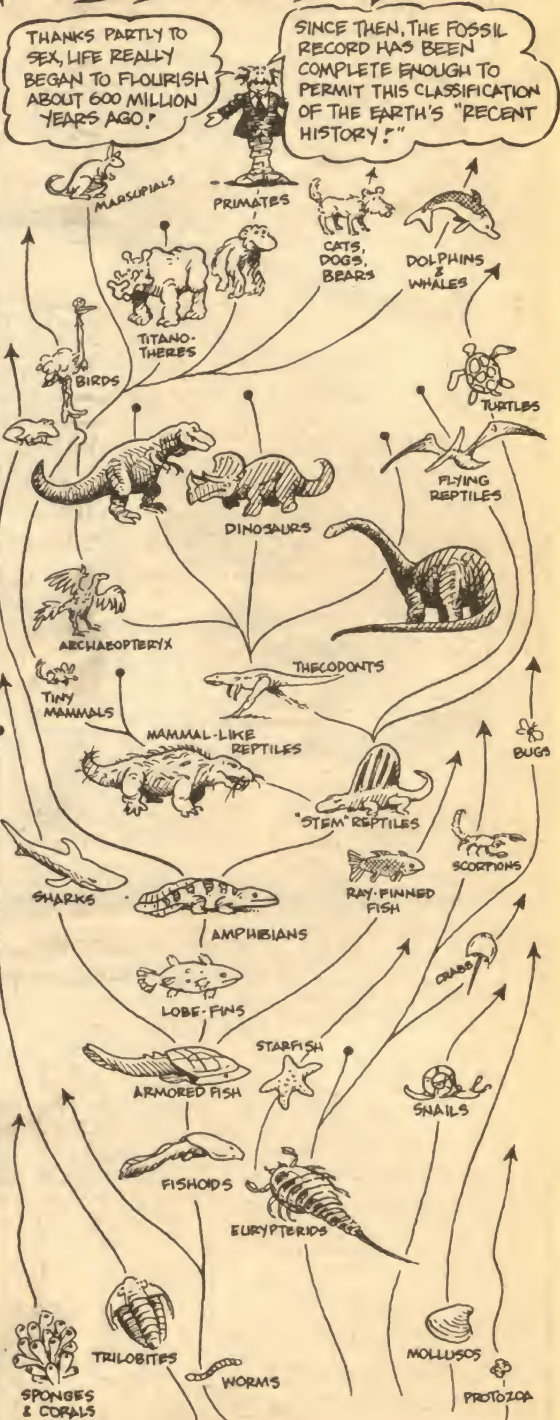
SO SEX WAS GOOD FOR INDIVIDUAL DIFFERENCES, AND INDIVIDUAL DIFFERENCES WERE GOOD FOR SURVIVAL. THEREFORE, SEXUAL BEINGS **SURVIVED**, AND THE ONES WHO DID BEST WERE THE ONES WHO **LIKED** SEX THE **MOST**—WHICH IS WHY SEX FELT GOOD **THEN**, FEELS GOOD **NOW**, AND CAN ONLY FEEL **BETTER** TOMORROW!!!





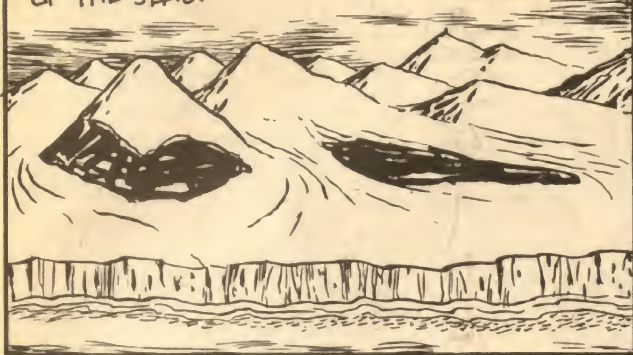
# MODERN TIMES

ERAS	PERIODS	DURATION	YEARS AGO
		(MILLIONS)	
CENOZOIC	<b>QUATERNARY</b> THE WEIRDEST MAMMAL OF THEM ALL.	3	3
	<b>TERTIARY</b> WEIRD MAMMALS	65	
MESOZOIC	<b>CRETACEOUS</b> T. REX VS. THE FLOWERS	72	68
	<b>JURASSIC</b> BIRDY AND BRONTY	65	140
	<b>TRIASSIC</b> TINY MAMMALS	25	205
	<b>PERMIAN</b> WEIRD REPTILES	55	230
PALEOZOIC	<b>CARBONIFEROUS</b> THE FUTURE IS COAL-BLACK	65	285
	<b>DEVONIAN</b> FISH AND FOREST	60	350
	<b>SILURIAN</b> ON THE BEACH	20	410
	<b>ORDOVICIAN</b> "NO FISHIN'"	70	430
	<b>CAMBRIAN</b> LIFE IS HARD	100	500
PRE-CAMBRIAN TIME LASTED A BILLION YEARS			600





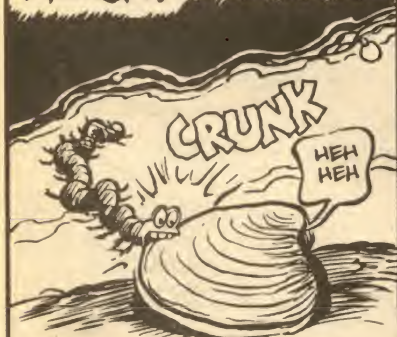
THE **CAMBRIAN** BEGAN AFTER AN ICE AGE. MOUNTAIN-BUILDING HAD RAISED THE LAND, AND GLACIERS HAD SOAKED UP THE SEAS.



... CAUSING COMPETITION FOR FOOD AND SPACE TO INCREASE!



AS A RESULT, ANIMALS FINALLY DEVELOPED SOME **ARMOR!**

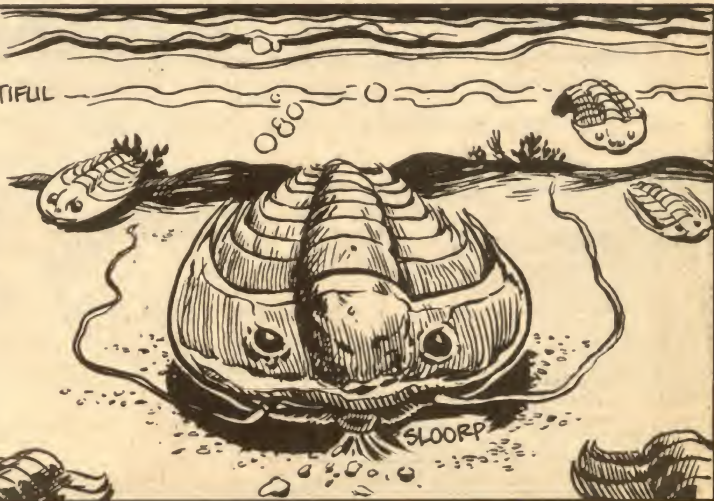


THUS, "HAPPY AS A CLAM" IS ONE OF THE MOST ANCIENT CLICHES!

WHEN THE ICE MELTED, AND SHALLOW SEAS AGAIN FLOODED THE LOWLANDS, PRACTICALLY THE WHOLE AQUARIUM HAD LIMY PLATES OR SHELLS.



THE CROWN OF CAMBRIAN CREATION WAS THE **TRILOBITE**, WHOSE PLENTIFUL FOSSILS YOU CAN BUY TODAY IN MUSEUM GIFT SHOPS. THESE 3-LOBED BOTTOM-DWELLERS, WITH THEIR GREAT VARIETY, FLEXIBLE ARMOR, GOOD EYES, AND WILLINGNESS TO EAT ANY SORT OF MUCK, SEEMED **ADAPTABLE** ENOUGH TO LAST FOREVER! AND YET





# THE ORDOVICIAN

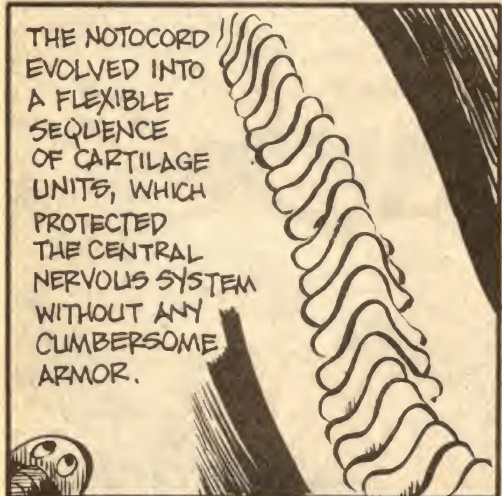
ALREADY PRODUCED A CHANGE WHICH WAS TO PUT TRILOBITES OUT OF THE SWIM — AND IT WASN'T THIS GIANT SHELL-SQUID (WHO WAS ONLY PASSING THRU).



A SMALL, SOFT, WORMY ANIMAL BEGAN TO DEVELOP AN INTERNAL STIFFENING ROD, CALLED A **NOTOCORD**, RUNNING ALONG ITS CENTRAL NERVE.



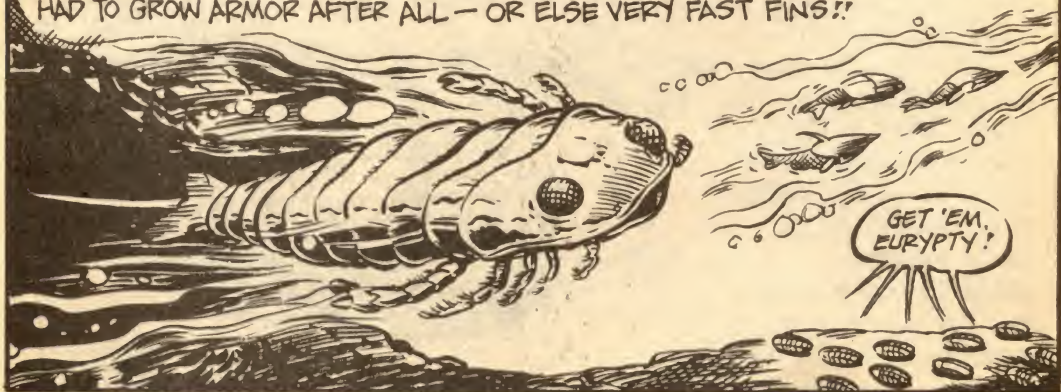
THE NOTOCORD EVOLVED INTO A FLEXIBLE SEQUENCE OF CARTILAGE UNITS, WHICH PROTECTED THE CENTRAL NERVOUS SYSTEM WITHOUT ANY CUMBERSOME ARMOR.



THE ANIMAL HAD NO BONES, NO JAWS, AND NO TEETH, YET IT WAS THE FIRST VERTEBRATE, ALMOST A **FISH!**



IN THE BRIEF BUT WILD **SILURIAN** THE JAWLESS FISH SHARED THE SEAS WITH **EURYPTERIS**, A 7-FOOT **SEA SCORPION**, SO THEY HAD TO GROW ARMOR AFTER ALL — OR ELSE VERY FAST FINS!!





BY EVOLVING SUPERIOR BRAINS, BACK-  
BONES, RIBS, SKULLS, SCALES, SPEED,  
AND - OF COURSE - **JAWS**, THE FISH  
SURVIVED AND THRIVED. THE

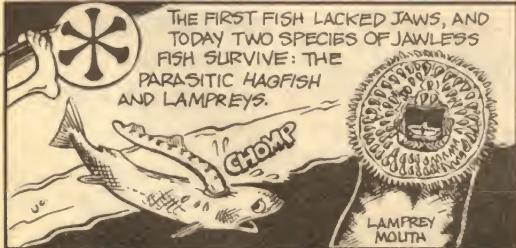
# DEVONIAN

IS CALLED THE AGE OF FISHES.

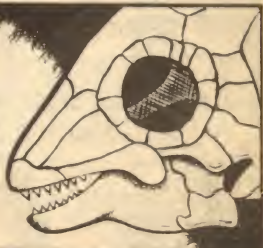


-GAK-  
OUR DAYS ARE  
NUMBERED!

THE FIRST FISH LACKED JAWS, AND  
TODAY TWO SPECIES OF JAWLESS  
FISH SURVIVE: THE  
PARASITIC HAGFISH  
AND LAMPREYS.



EXACTLY HOW JAWS  
EVOLVED IS NOT KNOWN.  
EARLY FISH JAWS ARE  
MADE UP OF SEVERAL  
BONY PIECES, EACH  
APPARENTLY SECRETED  
ALONG A NERVE  
LINE.

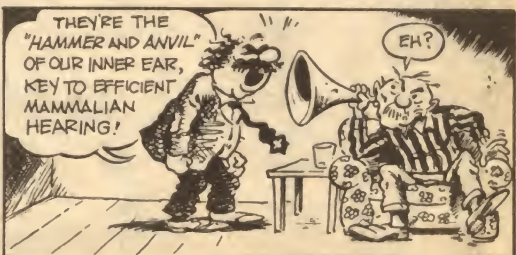


IN MAMMALS THE JAW  
HAS BECOME ONE  
BONE, BUT TWO TINY  
CHIPS REMAIN SEPARATE,  
IN A NEW ROLE.



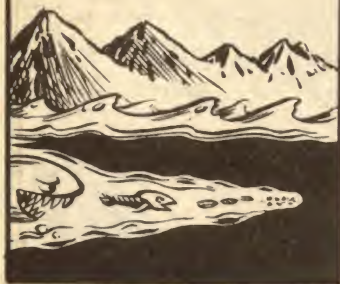
MALLEUS & INCUS

THEY'RE THE  
"HAMMER AND ANVIL"  
OF OUR INNER EAR,  
KEY TO EFFICIENT  
MAMMALIAN  
HEARING!





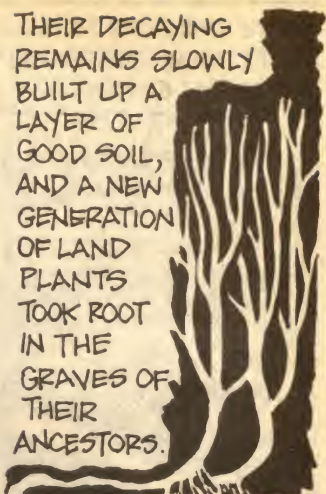
COMPETITION IN THE SEA WAS GETTING SO INTENSE THAT EVEN LIFE ON **LAND** STARTED TO LOOK GOOD.



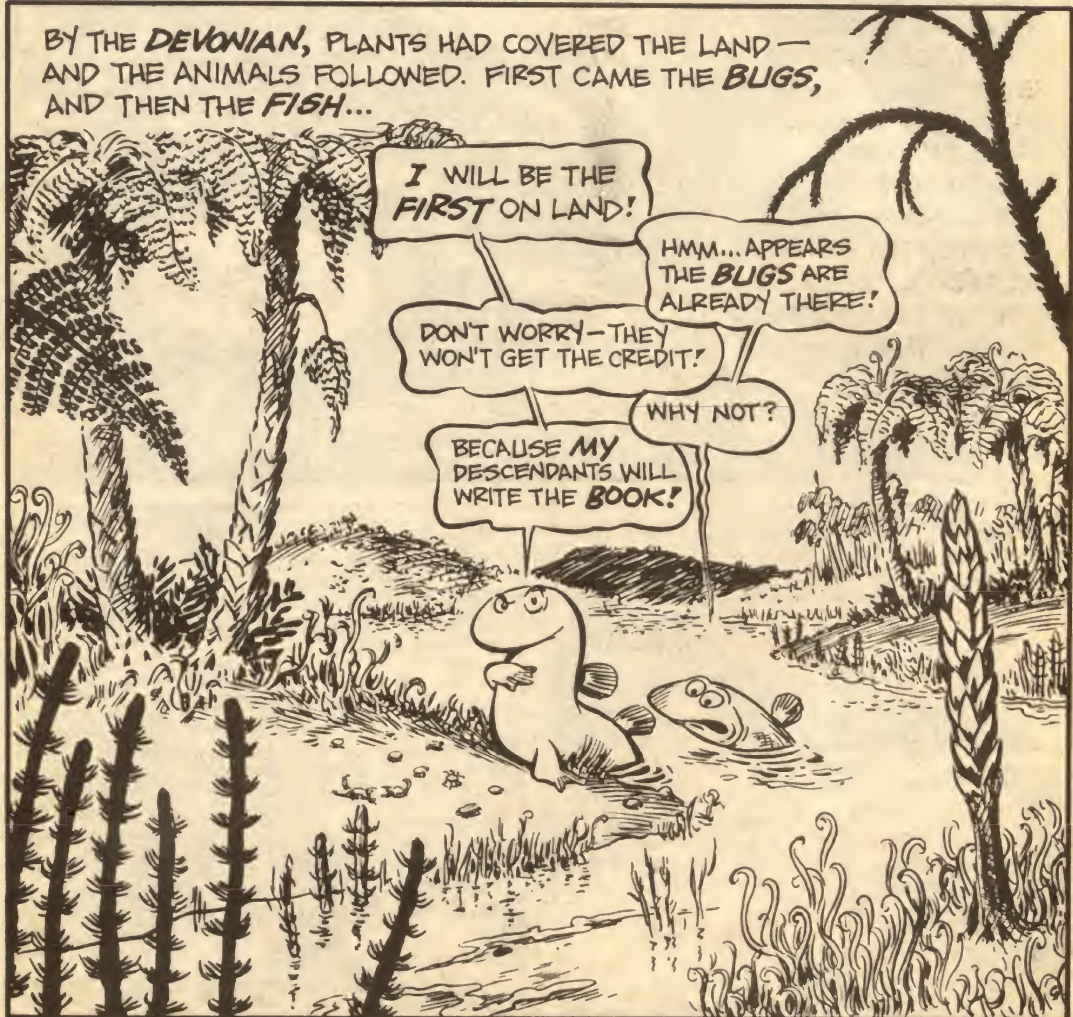
AS USUAL, **PLANTS** LED THE WAY. DURING THE ORDOVICIAN AND SILURIAN, THE ALGAE BEGAN CREEPING ONTO THE BEACH...



THEIR DECAYING REMAINS SLOWLY BUILT UP A LAYER OF GOOD SOIL, AND A NEW GENERATION OF LAND PLANTS TOOK ROOT IN THE GRAVES OF THEIR ANCESTORS.



BY THE **DEVONIAN**, PLANTS HAD COVERED THE LAND — AND THE ANIMALS FOLLOWED. FIRST CAME THE **BUGS**, AND THEN THE **FISH**...





SOME DARING FISH BEGAN WRIGGLING OUT OF THE WATER IN SEARCH OF FOOD OR GLORY—

WE ARE THE BRAVE PIONEERS...

LOOK OUT!

SPLASH

THE ONES THAT SURVIVED WERE THE ONES BEST ABLE TO WRIGGLE BACK!

PHEW! HARD ENOUGH TO BREATHE OUT HERE WITHOUT ALL THOSE DEAD FISH!

SO NATURE SELECTED IN FAVOR OF A STRONG SET OF FINS... WHICH GRADUALLY EVOLVED INTO **LEGS**. FOR BREATHING PURPOSES THE LAND-FISH ADAPTED ITS **AIR BLADDER**, ORIGINALLY USED IN THE WATER FOR BUOYANCY, INTO **LUNGS**...

THE RESULT OF THIS BIT OF EVOLUTION WAS **ICHTHYOSTEGA**—THE FIRST **AMPHIBIAN**.

AH!

MY FELLOW BUGS, WE MUST PREPARE FOR A LONG WAR!

WHILE WE USUALLY THINK OF A LUNGFISH AS THE FIRST ANIMAL OUT OF WATER, THE TRUE PIONEERS WERE THE **BUGS** (INSECTS, MILLIPEDES, SCORPIONS, ETC.).

WHAT ACCOUNTS FOR THE BUGS' SPECTACULAR SUCCESS (OVER 900,000 LIVING SPECIES) IS, AMONG OTHER THINGS, A WILLINGNESS TO EAT ANYTHING, INCLUDING OTHER BUGS...

GAK! FLIES? DON'T YOU KNOW WHAT THEY EAT?

SOME HAVE DEVELOPED REGIMENTED SOCIAL SYSTEMS...

IT IS GOOD THAT WE DO ALL THE WORK AND THE QUEEN GETS ALL THE SEX—

YES—GOOD FOR THE HIVE

WHILE OTHERS ARE JUST PLAIN INDESTRUCTIBLE!

★@#% COCKROACH!

IT'S LAUGHING—

STOMP CRUSH

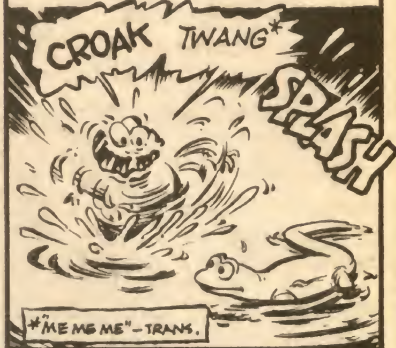


# THE CARBONIFEROUS

IS NAMED FOR **COAL**, THE EVENTUAL BY-PRODUCT OF THE FORESTS WHERE ICHTHYOSTEGA'S CHILDREN LIVED THEIR SEMI-FISHY LIVES. ESPECIALLY FISHY WERE THEIR **SEX** LIVES. CONSIDER:



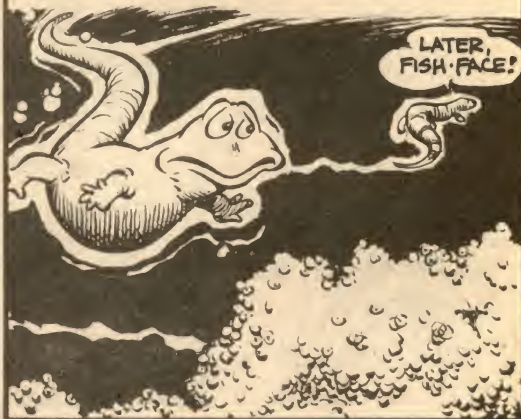
WHEN A MALE AMPHIBIAN SPOTTED A LIKELY FEMALE, HE WENT INTO A SONG AND DANCE.



SHE SIGNALLED ACCEPTANCE BY LAYING A **HUGE** NUMBER OF SOFT, SHELL-LESS EGGS IN THE WATER...



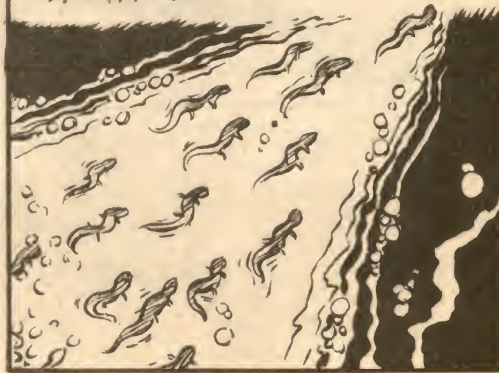
...AND LEFT THE REST TO HIM. THEY NEVER EVEN **TOUCHED!!**



THE MALE FERTILIZED THE EGGS IN PRIVATE.



THEY HATCHED, AND ANOTHER GENERATION OF AMPHIBIANS BEGAN ITS **MISERABLE** EXISTENCE...





**T**HEIR SEXUAL HABITS WERE KEEPING THE AMPHIBIANS IN THE WATER, BUT **HOW TO LAY EGGS ON DRY LAND?** A PROTECTIVE **SHELL** WOULD BE NEEDED, BUT THEN HOW COULD THE EGGS BE **FERTILIZED??**

**HOPELESS!**  
**I'M GOING BACK TO BEING A FISH!**

SOME AMPHIBIANS LAID **SEMI-SOFT EGGS**, WHICH HAD TO BE FERTILIZED BEFORE THE SHELL CONGEALED.

**NOW! NOW!**

**YEAH-UH-WAIT-ER-**



ONE THING LED TO ANOTHER...

**MAYBE IF I CLIMB UP HERE...**

**OO, HERBERT...**



...AND SOON, THEY LEARNED TO FERTILIZE THE EGGS **BEFORE** THEY WERE LAID—A METHOD WHICH HASN'T BEEN IMPROVED IN **300 MILLION YEARS!**



THEIR **HARD-SHELLED EGGS** COULD BE LAID ANYWHERE, AND THESE AMPHIBIANS WERE NOW ROMANTIC **REPTILES!**



IN THE EVOLUTION OF SEX, NO ANIMALS HAVE ACQUIRED MORE BIZARRE HABITS THAN THE INSECTS. ALMOST ALL BEES, FOR EXAMPLE, ARE **FEMALE**, AND AT SEASON'S END THEY DRIVE THE MALES FROM THE HIVE.



**IF YOU ASK ME THE QUEEN HAS THEM TOTALLY BRAINWASHED!**

IN MANY SPECIES, THE MALE COURTS THE FEMALE WITH A GIFT OF SOMETHING TASTY, LIKE A DEAD FLY OR A BALL OF DUNG...

**FOR OUR BRIDAL CHAMBER!**

**AW...**



PRAYING MANTISES MAY HAVE CARRIED THIS RITUAL A MITE TOO FAR, AS THE FEMALE EATS THE **MALE HIMSELF** AFTER THE ACT.

**OOH, HERBERT, THIS HAS BEEN A ONCE-IN-A-LIFETIME EXPERIENCE! (CHOFF CHOFF)**



AND SPEAKING OF **MITES**, TERMITES FORM STABLE MARRIAGES THAT CAN LAST FOR YEARS.

**BUT EVERYONE KNOWS A TERMITE'S LIFE IS BORING, RIGHT, HONEY?**







ANOTHER PROBLEM  
FACED BY REPTILES  
WAS *REGULATING*  
*BODY HEAT*.

THIS IS HARDER  
ON LAND, WHERE  
TEMPERATURES  
FLUCTUATE MORE  
THAN IN THE WATER.



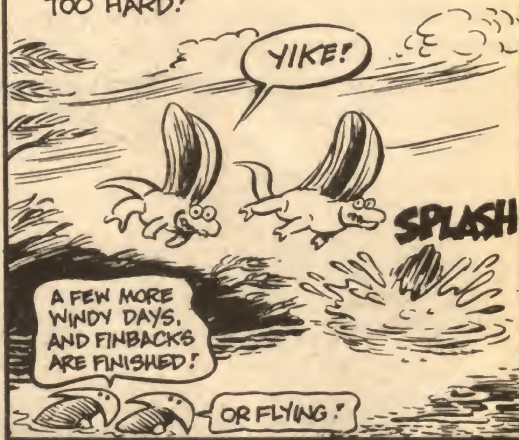
DURING THE **PERMIAN**, MANY  
REPTILES BECAME EXPERT SUN-BATHERS, CATCHING  
THE RAYS WITH SPECIALLY DESIGNED **SOLAR**  
**COLLECTORS**, THEN RETREATING TO SHADE  
WHEN THEY'D HAD ENOUGH.



THIS WORKED FINE AS LONG AS  
THE SUN WAS OUT AND THE  
WEATHER WAS WARM...



...OR THE WIND WASN'T BLOWING  
TOO HARD!



MEANWHILE, IN  
COOL PERMIAN  
SOUTH AFRICA,  
OTHER REPTILES,  
THE *THERAPSID*S,  
WERE LEARNING  
TO GENERATE  
HEAT *INTERNALLY*,  
BY BURNING THEIR  
FOOD FASTER...

THIS MEANT THERAPSIDS HAD TO *EAT* MORE THAN  
ORDINARY REPTILES.





TO GATHER THEIR FOOD MORE ACTIVELY, THERAPSID GAVE UP THE SLITHERING GAIT OF THE LIZARDS IN FAVOR OF A MORE UPRIGHT STANCE.



FOR MORE EFFICIENT PROCESSING, THEIR **TEETH** DIVERSIFIED INTO CUTTERS AND GRINDERS...



**HAIR** PROBABLY STARTED AS THERAPSID SIDE-WHISKERS, USED TO EXTEND THE SENSE OF TOUCH, AND THEN SPREAD OVER THE BODY LATER, AS A WAY TO KEEP WARM.



BECAUSE OF THEIR STRUCTURE, TEETH, AND PROB- ABLE HAIR, THE THERAPSIDS ARE ALSO KNOWN AS **MAMMAL-LIKE REPTILES**.



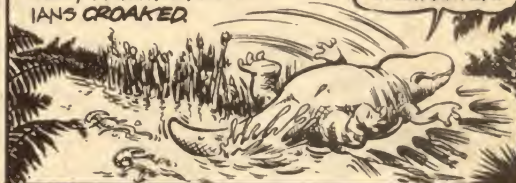
THE RISE OF THE MAMMAL-LIKE REPTILES MARKED A GREAT EPISODE OF **EXTINCTION**—THE FIRST OF THREE IN EARTH HISTORY.

—HUWAPH: DON'T EVERYBODY TAKE OFF AT ONCE!



IN THE SEA, THE LAST TRILOBITES DIED OUT, WHILE ON LAND MANY PRIMITIVE AMPHIB- IAN'S CROAKED

—URK! A LETHAL PLAN!

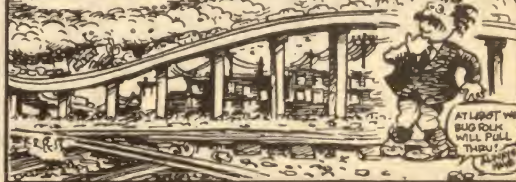


THE **SECOND** EPISODE OF MASS DEATH CAME 160 MILLION YEARS LATER, WITH THE EXTINCTION OF THE **DINOSAURS** (ABOUT WHICH MORE LATER).



AND THE **THIRD** IS NOW, AS WE HUMANS WIPE OUT THE WILDLIFE.

SURE HOPE WE CAN PRESERVE OURSELVES?





IN THE EARLY TRIASSIC, THERAPSID  
FACED THEIR FIRST REAL COMPETITION, SPEEDY  
LITTLE BIPEDS CALLED THECODONTS.

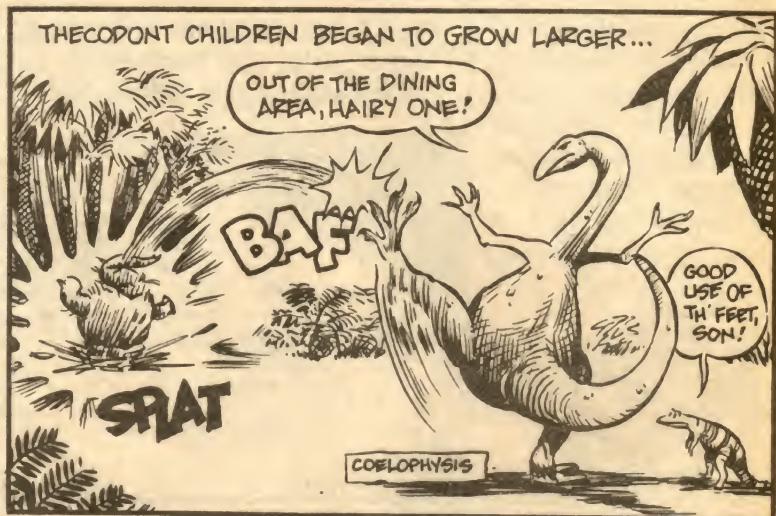


DESCENDED FROM  
AQUATIC REPTILES  
WHOSE LONG HIND  
LEGS WERE ADAPTED  
FOR SWIMMING,  
THECODONTS FOUND  
LONG LEGS TO BE  
HANDY ON LAND,  
TOO!

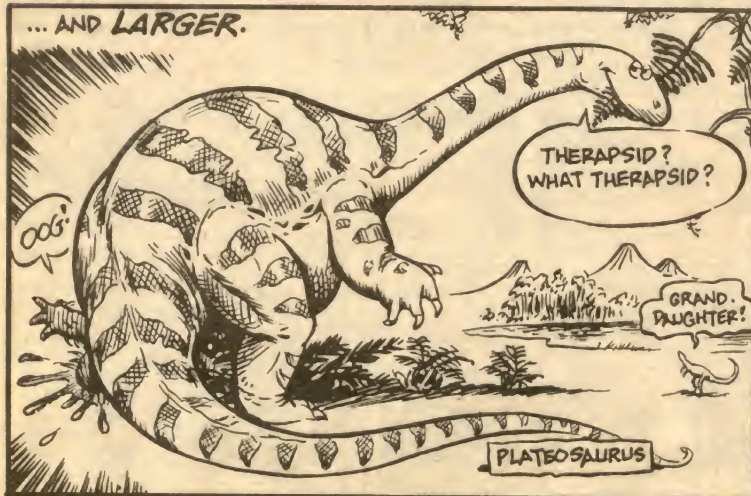
OUR FAMILY  
WILL MAKE  
GIANT STRIDES!



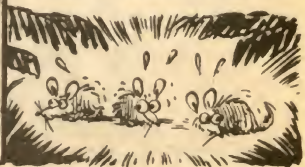
ONLY TWICE IN  
EARTH HISTORY  
HAS A QUADRUPED  
STOOD UP ON TWO  
LEGS, AND BOTH  
TIMES THE EX-  
PERIMENT WAS  
A FANTASTIC  
SUCCESS (FOR  
THE ANIMAL THAT  
TRIED IT, ANYWAY)...



... AND LARGER.



UNABLE TO COMPETE  
WITH SUCH  
MONSTERS, THE  
LARGER THERAPSID  
DIED OUT. ONLY  
A FEW VERY  
SMALL TYPES  
SURVIVED TO  
EVOLVE INTO THE  
FIRST MAMMALS.





FOR 130 MILLION YEARS  
THE TINY MAMMALS  
WERE KEPT DOWN BY  
THE THECODONTS'  
GIANT DESCENDANTS—  
OTHERWISE KNOWN AS  
THE **DINOSAURS!!**

EVERYONE STILL  
TINY DOWN THERE?  
**GOOD!!**

TERATOSAURUS

WHEN GIANT REPTILE  
BONES WERE FIRST  
UNEARTHED IN THE  
LATE 1700'S, THEY  
PRESENTED A **CHALLENGE**  
TO **RELIGION**. THE BIBLE SAYS  
NOTHING ABOUT EXTINCT SPECIES!

GOD IS PERFECT, THEREFORE  
HE WOULDN'T CREATE ANYTHING  
HE DIDN'T INTEND TO USE,  
THEREFORE THIS DOESN'T **EXIST!**

IMPECCABLE  
LOGIC.

IN AN EFFORT TO BE ACCOMODATING,  
SCIENTISTS PROPOSED THE THEORY  
OF **MANY CREATIONS**: EXTINCT  
SPECIES HAD BEEN WIPED OUT  
IN A SERIES OF CATASTROPHES,  
EACH FOLLOWED BY A **FRESH**  
CREATION.

...AND IT REQUIRES ONLY A  
**MINOR** RE-WRITE OF A FEW  
PAGES IN **GENESIS!**

IT COULD BE  
ARRANGED, I  
GUESS...

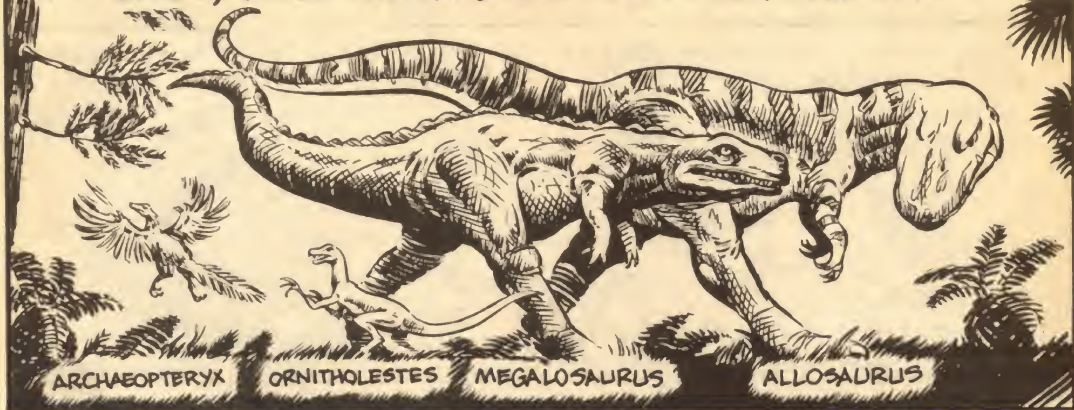
THUS, WHEN THE THEORY OF  
**EVOLUTION** WAS FINALLY  
ANNOUNCED IN 1859, DINOSAURS  
WERE USED AS AN ARGUMENT  
**AGAINST** IT!!

IT'S SIMPLE, REALLY!  
WHEN NOAH SAILED, THE  
DINOSAURS MISSED  
THE BOAT!



# JURASSIC

IN THE JURASSIC, SMALL DINOSAURS EVOLVED INTO *BIRDS*, WHILE THE LARGE MEAT-EATERS GOT EVEN MEATIER.



ARCHAEOPTERYX

ORNITHOLESTES

MEGALOSAURUS

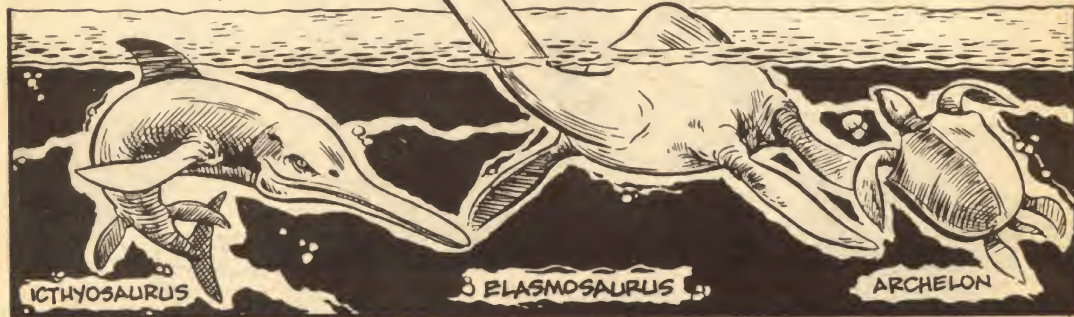
ALLOSAURUS

DINOSAUR COUSINS INVADDED THE AIR AND THE SEA.

PTERODACTYL



PTERODACTYL

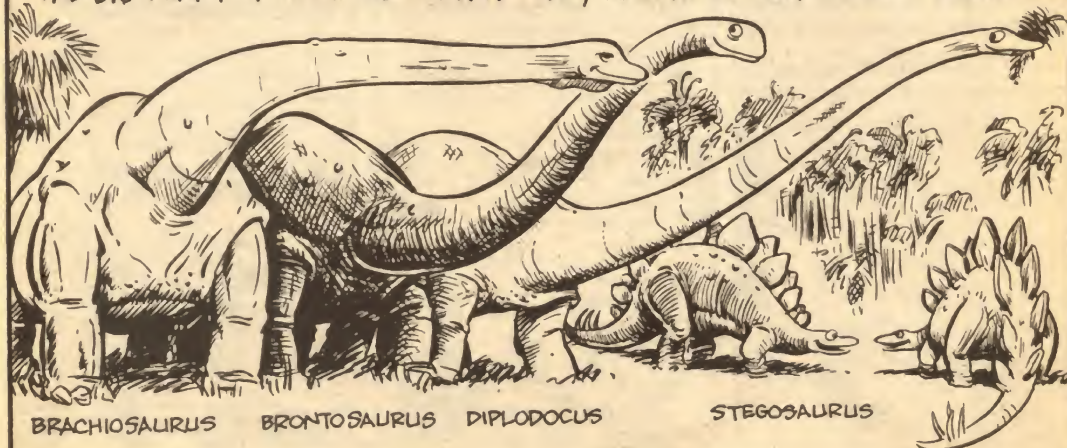


ICHTHYOSAURUS

ELASMOSAURUS

ARCHELON

THE BIG PLANT-EATERS GOT SO *FAT* THEY HAD TO RETURN TO ALL FOURS.



BRACHIOSAURUS

BRONTOSAURUS

DIPLODOCUS

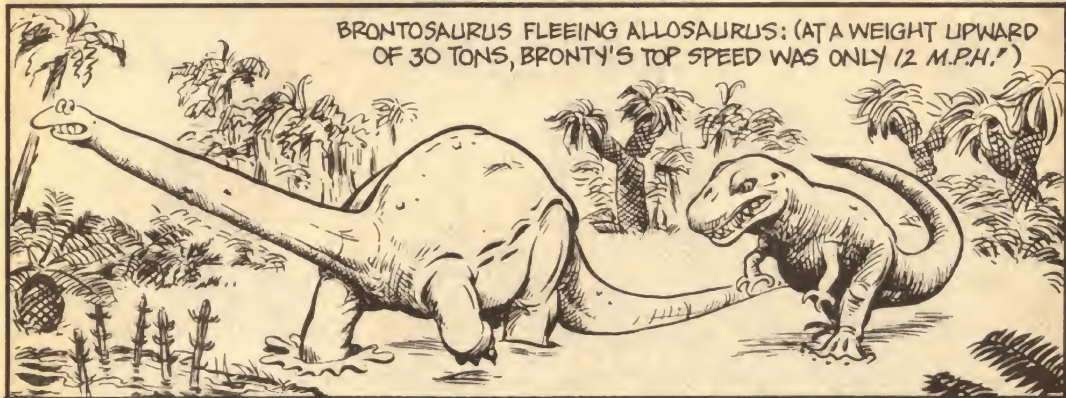
STEGOSAURUS



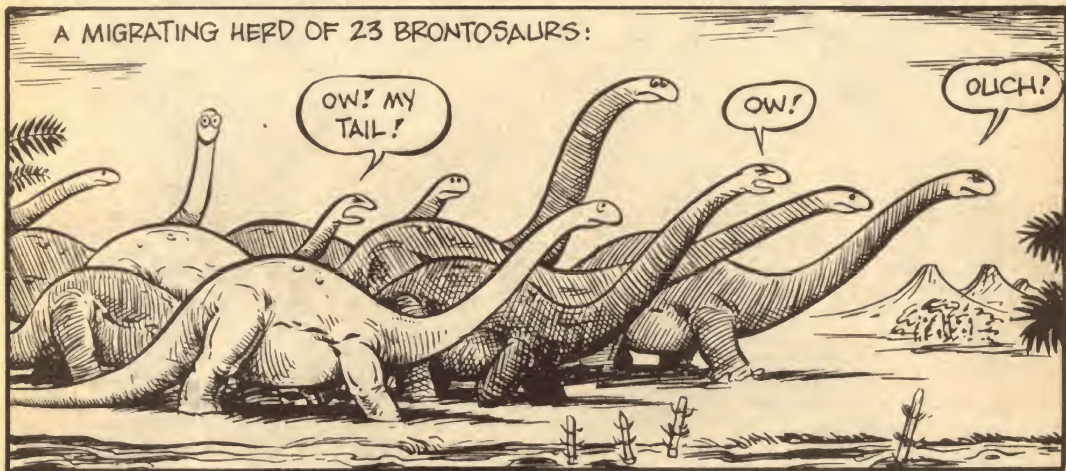


BECAUSE BRONTOSAURS OFTEN WALKED IN MUD, THEY LEFT BEHIND **FOSSIL FOOTPRINTS**, WHICH HAVE GIVEN US GLIMPSES OF **ACTUAL EPISODES** OF BRONTOSAURIAN LIFE. HERE ARE THREE:

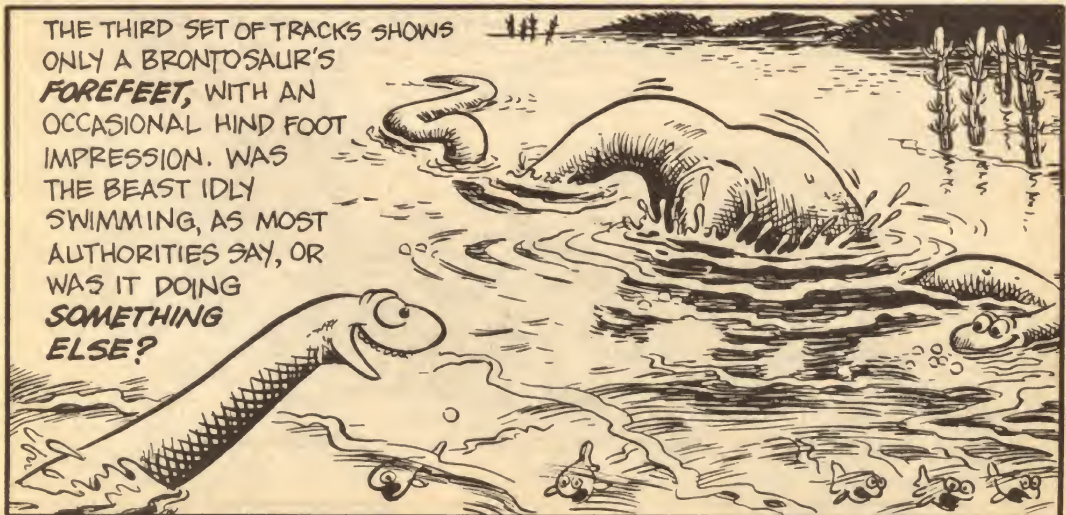
BRONTOSAURUS FLEEING ALLOSAURUS: (AT A WEIGHT UPWARD OF 30 TONS, BRONTY'S TOP SPEED WAS ONLY 12 M.P.H.)



A MIGRATING HERD OF 23 BRONTOSAURS:



THE THIRD SET OF TRACKS SHOWS ONLY A BRONTOSAUR'S **FOREFEET**, WITH AN OCCASIONAL HIND FOOT IMPRESSION. WAS THE BEAST IDLY SWIMMING, AS MOST AUTHORITIES SAY, OR WAS IT DOING **SOMETHING ELSE?**





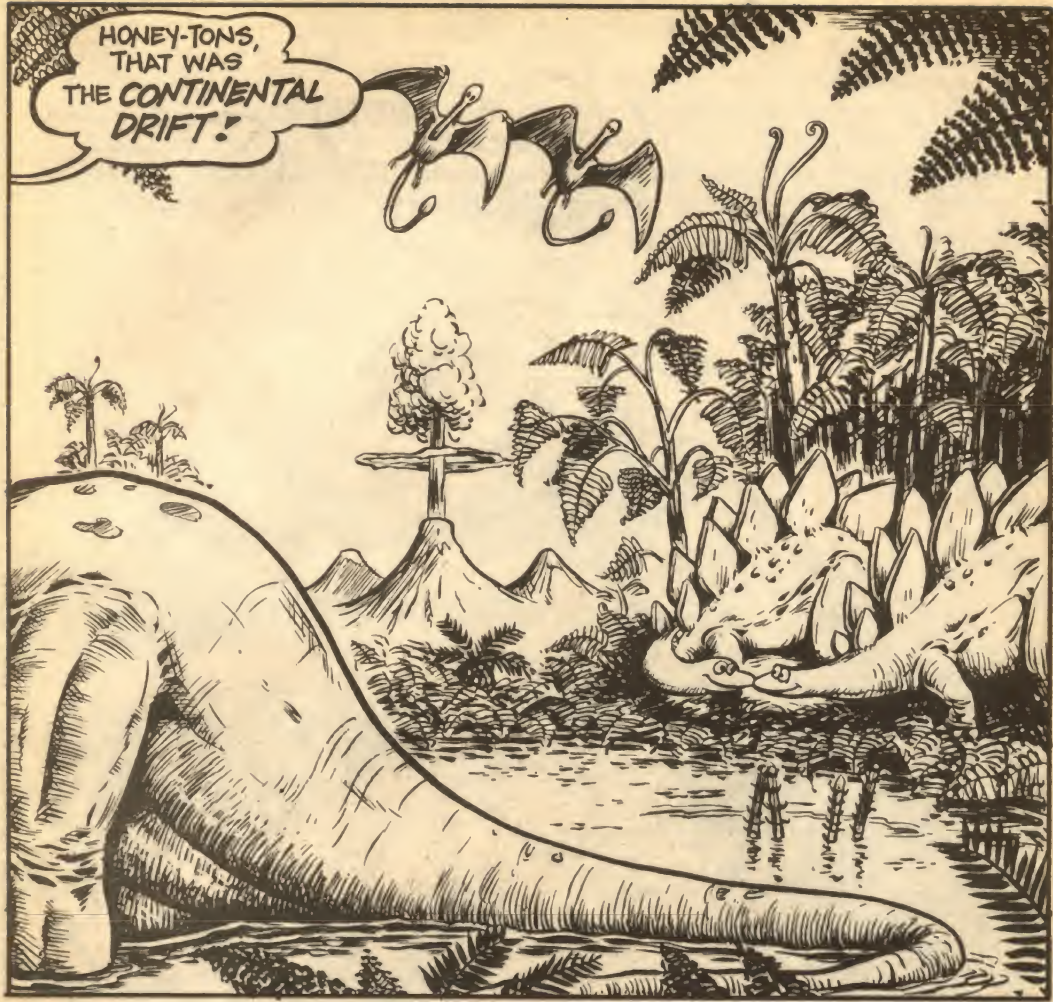
AND **AFTERWARDS**, THE BRONTOSAURS  
INVENTED **NECKING**!

DID YOU  
FEEL THE **EARTH**  
MOVE?





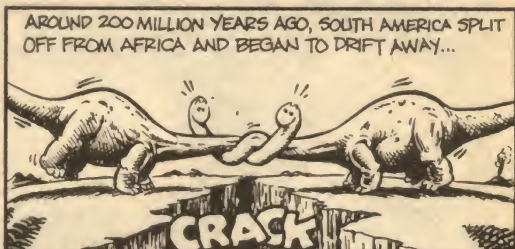
HONEY-TONS,  
THAT WAS  
THE **CONTINENTAL  
DRIFT!**



IN THE EARLY DINOSAUR ERA, ALL THE  
CONTINENTS WERE LUMPED TOGETHER  
ON ONE SIDE OF  
THE EARTH.



AROUND 200 MILLION YEARS AGO, SOUTH AMERICA SPLIT  
OFF FROM AFRICA AND BEGAN TO DRIFT AWAY...



TODAY, THE **CONTINENTAL DRIFT** CONTINUES AS  
HEAT, RISING FROM INSIDE THE EARTH, MAKES THE  
SOLID ROCK **FLOW**.



NORTH AMERICA IS RIDING A WESTWARD FLOW. IN  
CALIFORNIA IT RUNS INTO A CONTRARY FLOW. THE  
RESULT: **EARTHQUAKES!**





THE CROWDED

# CRETACEOUS

WAS THE HEIGHT

OF THE DINOSAUR ERA. IN THIS SCENE, THE GIANT **TYRANNOSAURUS REX** EYES SOME **DUCKBILLS** WHILE HIS COUSIN **GORGOSAURUS** FLEES FROM A RAMPAGING HERD OF **TRICERATOPS**. SPECTATORS INCLUDE TWO ARMORED **ANKYLOSAURS**, AN AIRBORNE **PTERANODON**, AND SOME DISTANT **TITANOSAURS**. **STRUTHIOMIMUS** ("OSTRICH-MIMIC") IGNORES THE WHOLE SITUATION!



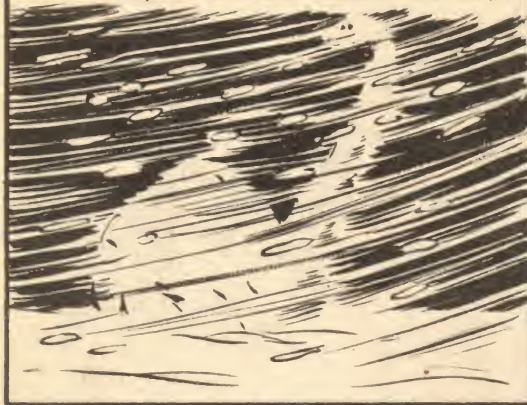


THE VEGETATION BEGINS TO LOOK MODERN, AS BROADLEAF TREES AND GRASS APPEAR FOR THE FIRST TIME. SOME PLANTS ARE DEVELOPING **FLOWERS**, TO LURE THE NEWLY-EVOLVED **BEES**, WHO WILL BE USED TO CARRY POLLEN TO OTHER FLOWERS FOR PURPOSES OF PLANT SEX. A FEW LARGE BIRDS HAVE ALSO APPEARED.





SUDDENLY, AROUND 70 MILLION YEARS AGO, FOR REASONS THAT ARE STILL UNCLEAR, THE WORLD COOLED RAPIDLY.



IN THE OCEAN, ENTIRE POPULATIONS OF ONE-CELLED PLANKTON PERISHED, SETTING OFF AN **ECOLOGICAL CATASTROPHE**.

HEY!  
WHAT ARE WE  
SUPPOSED TO  
EAT?



WITH THE BASIS OF THE FOOD CHAIN GONE, MANY FAMILIES OF SEA LIFE WERE WIPED OUT, INCLUDING VARIOUS FISH, SHELLFISH, AND ALL THE GREAT SEA REPTILES...



ON LAND THE DEVASTATION WAS EQUALLY WIDESPREAD. AS PLANTS DIED OUT, ALL ANIMALS BEGAN TO SUFFER, ESPECIALLY THE GIANTS.



THE UNDERNOURISHED DINOSAURS, LIKE POISONED BIRDS, LAID EGGS WITH THINNER AND THINNER SHELLS. THE EMBRYOS, UNABLE TO DRAW ENOUGH CALCIUM FROM THEIR EGG-SHELLS TO DEVELOP BONES, WERE TOO WEAK TO HATCH...





AFTER 130 MILLION YEARS OF DOMINANCE,  
THE DINOSAURS HAD FINALLY LEFT THE  
WORLD TO THEIR OLD COMPETITORS, THE  
**TINY MAMMALS.**



THE DISAPPEAR-  
ANCE OF THE  
**DINOSAURS**  
HAS GIVEN RISE

TO MANY **THEORIES**,  
SOME OF WHICH DO NOT TAKE  
ALL THE FACTS INTO ACCOUNT.

**CLEARLY**, THEY  
WERE ALLERGIC TO  
NEWLY - EVOLVED  
PLANTS, AND **SNEEZED**  
THEMSELVES TO  
DEATH!

**CLEARLY**, MY  
DEAR COLLEAGUE,  
TINY MAMMALS  
ATE THEIR EGGS!

MAYBE THEY  
ROTTED THEIR  
TINY BRAINS  
WITH DINOSAUR  
COMICS?



THE LATEST EXPLANATION SUG-  
GESTS THEY WERE DONE IN BY A  
**SUPERNOVA** IN OUTER SPACE.  
THE INTENSE RADIATION, HARM-  
FUL IN ITSELF, WOULD ALSO  
DISRUPT THE WORLD'S **CLIMATE**,  
CAUSING THE SUDDEN COOLING  
EVIDENT IN THE FOSSIL RECORD.



BUT AS THE DEBATE GOES ON,  
DINOSAUR FANS, REMEMBER:  
ONLY THE **BIG** ONES DIED OUT.  
THE **SMALL** DINOSAURS, WHICH  
SPROUTED **WINGS**, ARE STILL  
WITH US — AS **BIRDS**!!



THEY BUILT  
ROCKETS  
AND BLASTED  
OFF! OOF!

THEY WENT  
OUT FOR CIGARETTES  
AND NEVER CAME  
BACK!

DUCK!  
A  
DINOSAUR  
!!



# • THE AGE OF MAMMALS •

## EPOCHS OF THE TERTIARY PERIOD (SEE P. 18)

EPOCH	DURATION (MILLIONS)	YEARS AGO
PLIOCENE	15	3
MIOCENE	12	18
OLIGOCENE	11	30
Eocene	22	41
PALEOCENE	5	63
		68
CRETACEOUS PERIOD		

THE TINY MAMMALS SCURRIED OUT OF THE SHADOWS, RACING TO TAKE THE PLACES VACATED BY THE DINOSAURS.



**CHIRP**



GO UNDERGROUND, FRED!

SOME WENT FOR THE PLAINS, DODGING THE 8 FOOT "TERROR CRANE" DINORNIS.

OTHERS CHASED INSECTS INTO THE AIR.



STILL OTHERS DEVELOPED A TASTE FOR FISH AND TRIED TO SWIM.



...WHILE OUR ANCESTORS, THE PRIMATES, JUST STAYED IN THE TREES, WHERE THEY HAD ALWAYS BEEN!





BY THE **EOCENE** EPOCH, MAMMALS WERE NO LONGER TINY. HERE WE SEE **UINTATHERIUM**, 7 FEET TALL AT THE SHOULDER, **ZEUGLONDON**, AN ANCESTRAL WHALE, SOME EARLY **BATS**, **CORYPHODON**, A PRIMITIVE HOOFED MAMMAL, AND LITTLE **EOHIPPIUS**, THE "DAWN HORSE."



EXACTLY HOW **WINGS** EVOLVED IS SOMETHING OF A MYSTERY.

THE PROBLEM IS THAT **PARTLY**-EVOLVED WINGS ARE USELESS FOR FLYING!



SINCE TRYING TO FLY WOULD BE FATAL, IT'S HARD TO SEE HOW A HALF-WINGED ANIMAL COULD LIVE TO REPRODUCE. AND YET...

THIS IS BATTY!



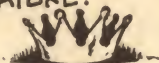
THE ANSWER SEEMS TO BE THAT HALF A WING HAS SOME **OTHER** FUNCTION, LIKE SNAGGING BUGS, AND ONLY LATER IS USED FOR FLIGHT.

WOW! LOOK HOW BERNADETTE IS USING HER BUG-SNAGGERS!





SO MANY **DELICIOUS** SPECIES WERE NOW EVOLVING, THAT MAMMALS BEGAN EATING **EACH OTHER**. THE EARLIEST MAMMAL MEAT-EATERS, THE CRUDE CREODONTS, WERE PUSHED ASIDE BY MORE **INTELLIGENT** TYPES, WHO QUICKLY BECAME THE **ROYALTY** OF NATURE.



WE'RE THE **REIGNING** CATS AND DOGS.?"

**YOWL!**

I KILL FOR PUNS LIKE THAT!



THE PREY THAT GOT AWAY WERE THE **FAST** ONES —EARLY HORSES, PIGS, ANTELOPES, AND LITTLE RUNNING RHINOS.



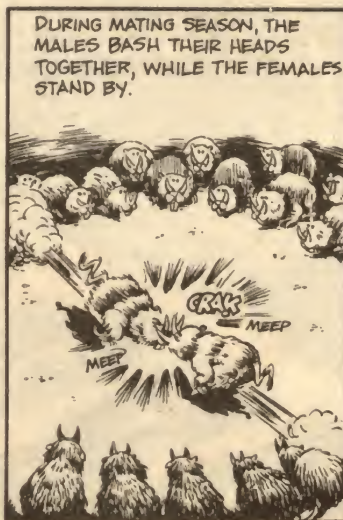
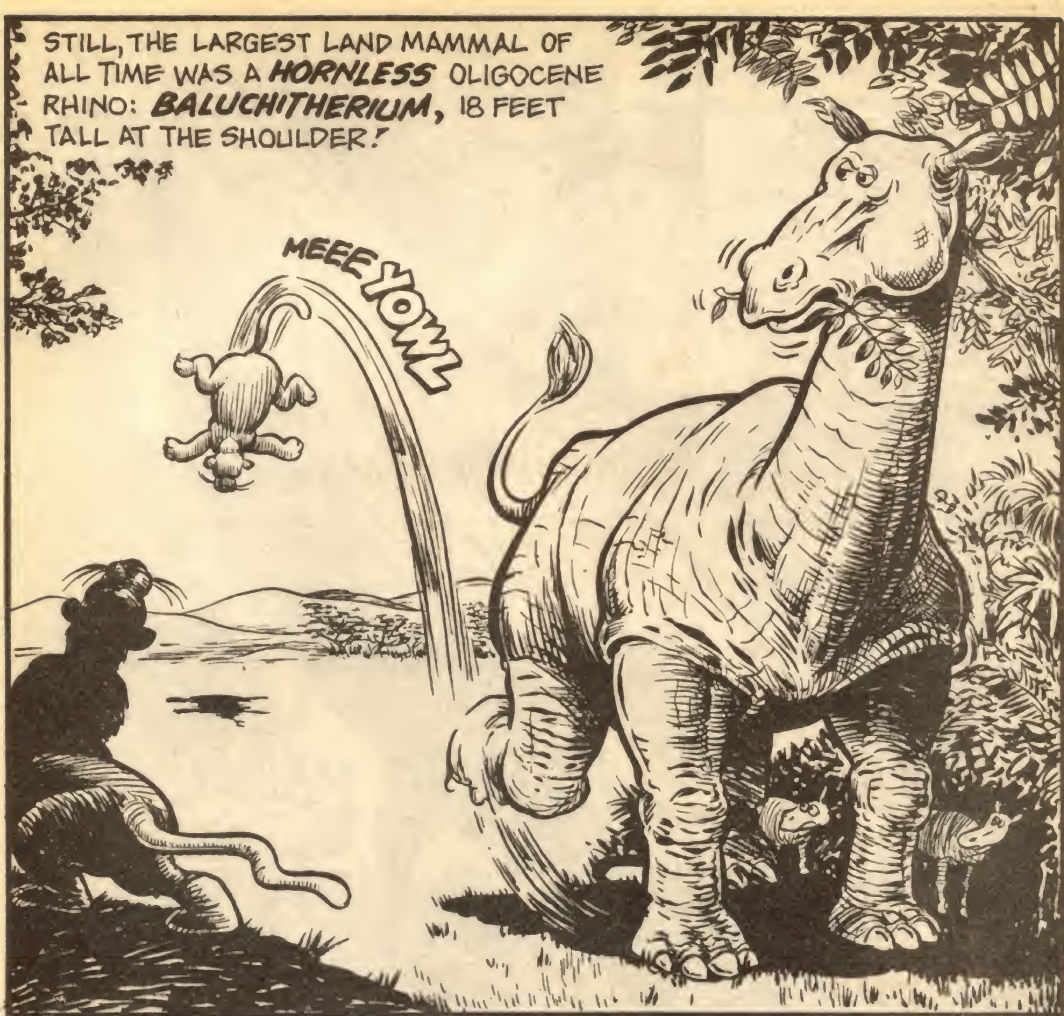
THE ONES THAT DIDN'T **NEED** TO GET AWAY WERE THE **MEAN** ONES —BIG RHINOS AND THEIR COUSINS. THE **OLIGOCENE** IS CALLED THE **AGE OF HORNS!**

**SNORT**



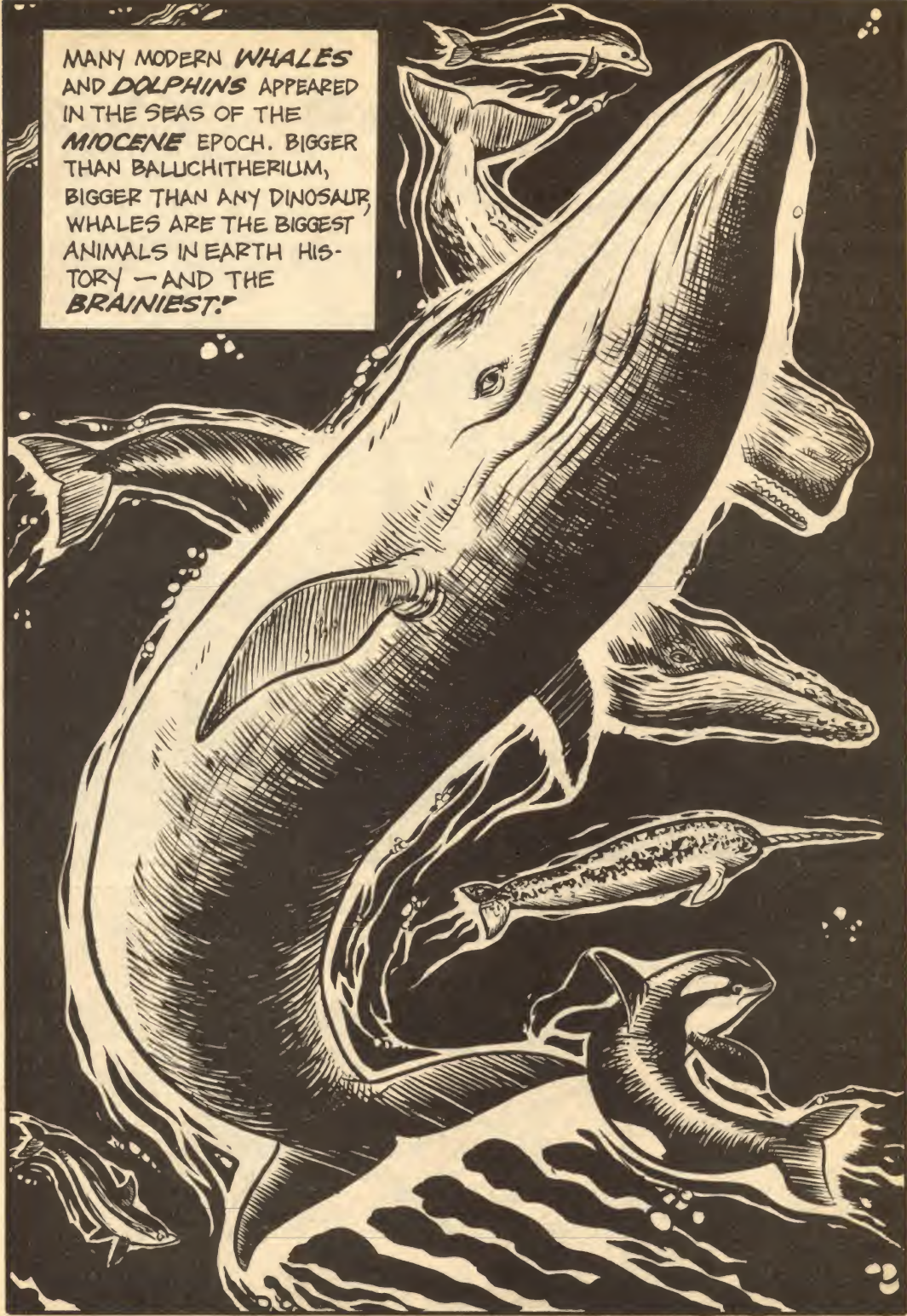


STILL, THE LARGEST LAND MAMMAL OF ALL TIME WAS A **HORNLESS** OLIGOCENE RHINO: **BALUCHITHERIUM**, 18 FEET TALL AT THE SHOULDER!



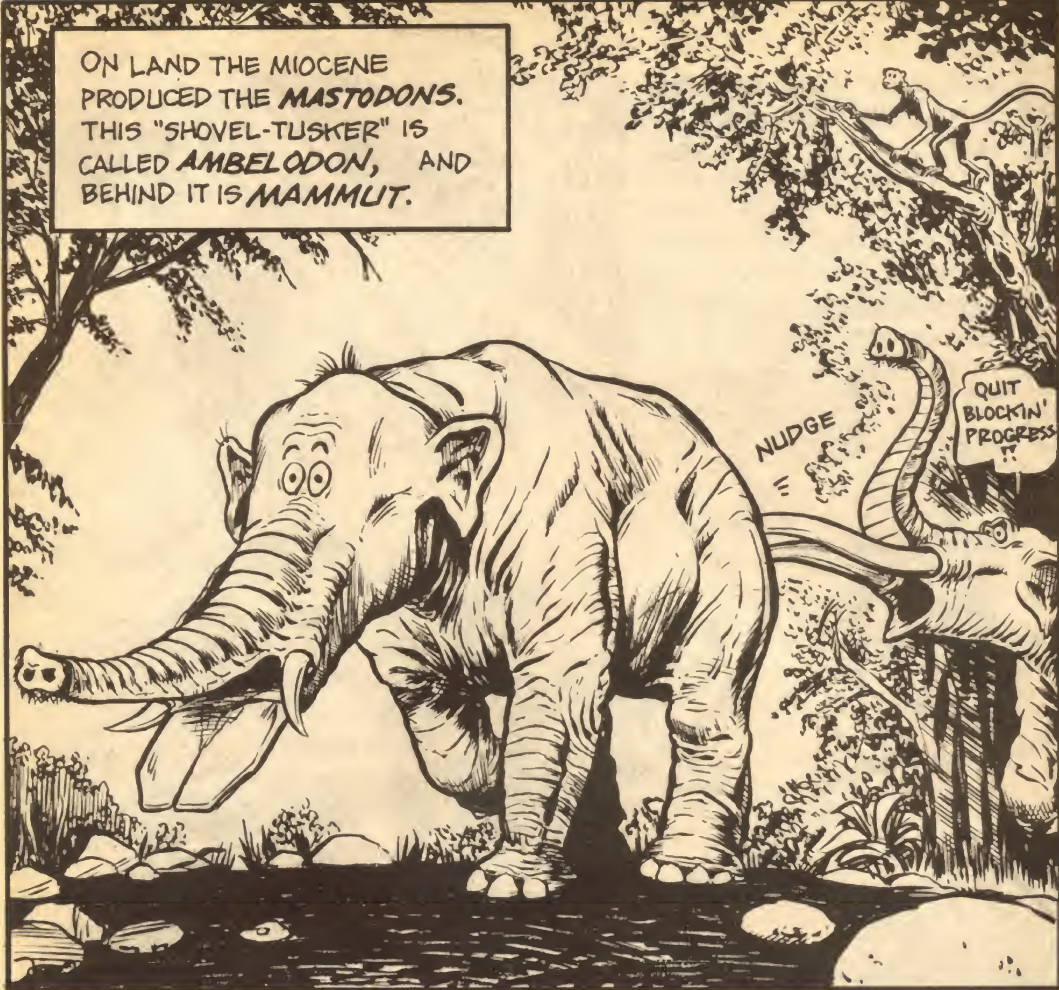


MANY MODERN **WHALES**  
AND **DOLPHINS** APPEARED  
IN THE SEAS OF THE  
**MIOCENE** EPOCH. BIGGER  
THAN BALUCHITHERIUM,  
BIGGER THAN ANY DINOSAUR,  
WHALES ARE THE BIGGEST  
ANIMALS IN EARTH HIS-  
TORY — AND THE  
**BRAINIEST.**





ON LAND THE MIOCENE  
PRODUCED THE **MASTODONS**.  
THIS "SHOVEL-TUSKER" IS  
CALLED **AMBELODON**, AND  
BEHIND IT IS **MAMMUT**.



OUTSIDE THE MAM-  
MALIAN MAINSTREAM,  
IN ISOLATED SPOTS  
LIKE AUSTRALIA,

THE PRIMITIVE TYPES KNOWN AS  
**MARSUPIALS** AND **MONOTREMES**  
EVOLVED. THE MAIN MONOTREME  
IS THE **DUCK-BILLED PLATYPUS**,  
WHICH LAYS EGGS.

I THINK OF MYSELF  
AS A MAMMAL-  
BODIED DUCK?

MY MAIN  
MONOTREME!



MARSUPIALS —KANGAROOS, WOM-  
BATS, ETC. — GIVE BIRTH TO A  
**HALF-FORMED EMBRYO**  
WHICH THEY CARRY AROUND IN  
A SPECIAL POUCH UNTIL IT'S  
READY TO GO.

COOP? YOU  
READY YET?

GOSH, MOMMY,  
I DON'T KNOW...

TSK!



WHILE MOST MARSUPIALS ARE  
NOW ENDANGERED SPECIES, ONE,  
THE **OPOSSUM**, STILL THRIVES,  
UNCHANGED AFTER 40 MILLION  
YEARS! ITS SURVIVAL SECRET IS  
**COWARDICE!**

IT'S ONLY PLAYING POSSUM—  
WE COULD  
EAT IT...

YEAH...  
BUT WHO CAN  
STOMACH SUCH  
A WIMP?





M

EANWHILE, BACK IN THE TREES, THE **PRIMATES** STILL LIVED AS THEY HAD SINCE THE DAYS OF THE DINOSAURS.

PRIMITIVE PRIMATES RESEMBLE  
SQUIRRELS, BUT FOR SOME  
REASON SQUIRRELS DIDN'T  
EVOLVE INTO HUMANS.

EXCEPT IN A  
FEW CASES...



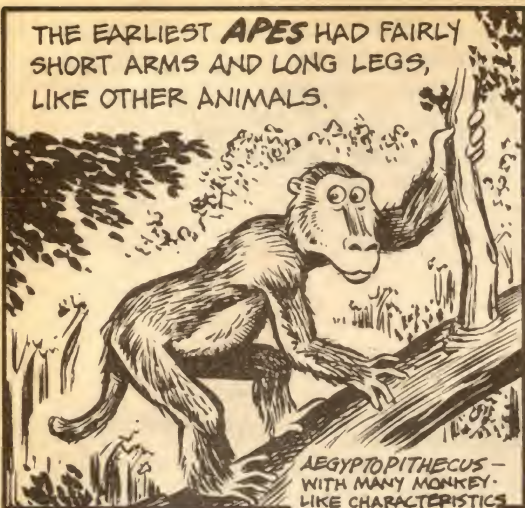
ONE REASON MAY BE THAT  
PRIMATES HAVE **TOENAILS**,  
INSTEAD OF CLAWS, SO THEY  
ARE FORCED TO **GRASP**  
THE BRANCH.

ANOTHER IS THAT  
PRIMATES EAT **BUGS**—  
SO, LIKE MANY **HUNTERS**,  
THEY DEVELOPED  
**STEREO VISION**, WITH  
BOTH EYES FACING FRONT.





THE EARLIEST **APES** HAD FAIRLY SHORT ARMS AND LONG LEGS, LIKE OTHER ANIMALS.



**AEGYPTOPITHECUS** - WITH MANY MONKEY-LIKE CHARACTERISTICS

BUT APES DISCOVERED A NEW WAY TO GET AROUND THE TREETOPS: "BRACHIATION" - OR **SWINGING**.



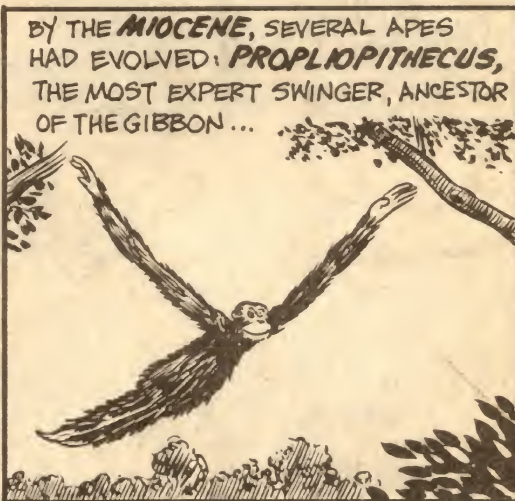
THIS NATURALLY LED TO LONGER ARMS, SHORTER THUMBS, AND SHORTER LEGS.



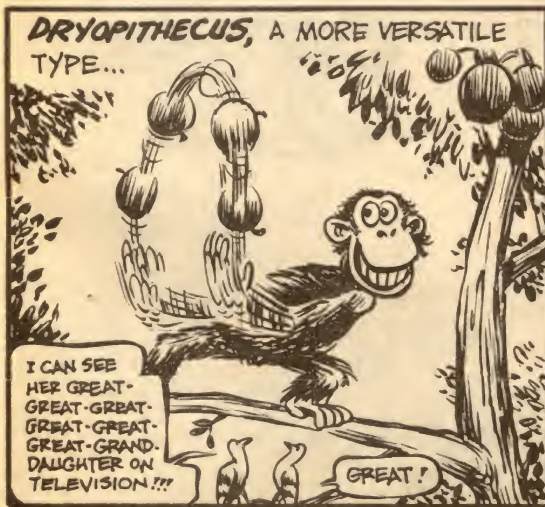
YOU ARE SUCH A SWINGER, YOU BIG APE!

AND MY KIDS WILL APE ME!

BY THE **MIOCENE**, SEVERAL APES HAD EVOLVED: **PROPLIOPITHECUS**, THE MOST EXPERT SWINGER, ANCESTOR OF THE GIBBON ...



**DRYOPITHECUS**, A MORE VERSATILE TYPE...



I CAN SEE HER GREAT-GREAT-GREAT-GREAT-GREAT-GRAND-DAUGHTER ON TELEVISION!!!

GREAT!

AND THE OBSCURE **RAMAPITHECUS**, WHICH APPARENTLY SPENT SOME TIME ON THE GROUND.





**A**ND SO WE COME TO THE PLACID *PLIOCENE*, CLIMAX OF THE AGE OF MAMMALS. DURING THE PLIOCENE, THE MIOCENE JUNGLES RECEDED, GIVING WAY TO VAST PLAINS COVERED WITH HERDS OF ANTELOPES, 3-TOED HORSES, CAMELS, GIRAFFES, RHINOS, AND MASTODONS. PLIOCENE CARNIVORES INCLUDED SABER-TOOTHED CATS, DOGS, "DOG-BEARS," AND HYENAS.





AS THE SAVANNAH ENCROACHED ON THEIR FOREST HOME, SOME OF THE **PRIMATES** WERE FINALLY FORCED OUT OF THE TREES. A GROUP OF PLIOCENE MONKEYS TOOK TO THE PLAINS AND EVOLVED INTO **BABOONS**. OF THE APES, ONLY **RAMAPITHECUS** STEPPED ONTO THE STEPPE, AT FIRST MAKING SHORT FORAYS FOR FOOD, BUT GRADUALLY STAYING LONGER AND LONGER. BY THE END OF THE EPOCH, THIS PRIMATE WALKED **UPRIGHT ON TWO LEGS**, AND WAS ADAPTED (MORE OR LESS) TO LIFE ON THE GROUND.





THE AGE OF HUMAN BEINGS HAD BEGUN.



NEXT: THE DESCENT  
AND ASCENT OF  
GENUS HOMO!!



WHEW! 13 BILLION YEARS OF TIME TRAVEL IN 48 PAGES... I'M BUSHED!

IF YOU STILL HAVE THE ENERGY TO READ MORE ON THE SUBJECT, I RECOMMEND THE FOLLOWING BOOKS:

### ASTRONOMY AND COSMOLOGY, A MODERN COURSE

BY FRED HOYLE. FRED HAS FINALLY COME AROUND ON THE BIG BANG. ALSO HAS INFO ON D.N.A. & GENETIC CODE (!)

**NEW FRONTIERS IN ASTRONOMY**  
A SCIENTIFIC AMERICAN COLLECTION. NOT ALL HEAVY GOING, AND SOME GREAT PICTURES.

**IN QUEST OF QUASARS** BY B. BOVA

**THE FIRST THREE MINUTES**  
BY STEPHEN WEINBERG. TITLE TELLS IT ALL.

**ESSENTIALS OF EARTH HISTORY**  
BY W. LEE STOKES. READABLE & COMPREHENSIVE. GOOD ON ORIGIN OF LIFE, TOO.

**PHYSICS OF THE EARTH**, BY T.F. GASKELL, REPRESENTS THE VIEWPOINT OF THE OIL CARTEL.

**HISTORICAL GEOLOGY**, BY CARL DUNBAR. MORE THAN YOU EVER WANTED TO KNOW ABOUT IGNEOUS SCHIST.

**FOSSILS**, BY RHODES, ZIM, & SCHAFER. POCKET-SIZED AND COLORFUL.

**THE FOSSIL BOOK**, BY C.I. AND M.A. FENTON. MILLIONS OF MEDIOCRE DRAWINGS.

**THE ORIGIN OF SPECIES**, BY CHARLES DARWIN. THE AUTHOR SHOWS PROMISE.

**EVOLUTIONARY BIOLOGY**, BY STANLEY SALTHER. I READ IT, BUT I CAN'T REMEMBER IT!

**THE LIVES OF A CELL**, BY LEWIS THOMAS. METAPHYSICAL MUSING ON MITOCHONDRIA

### PALEOZOIC FISHES

BY J.A. MOY-THOMAS, REVISED BY R.S. MILES. NOT MANY LAUGHS, BUT SOME LOVELY LINE DRAWINGS.

**DINOSAURS** BY EDWIN COLBERT. THE STANDARD WORK

**DINOSAUR RENAISSANCE**  
ARTICLE IN APR. 1975, SCIENTIFIC AMERICAN, BY UPSTART THEORIST ROBERT BAKKER, WHO MAKES A STRONG CASE FOR —

**THE HOT-BLOODED DINOSAURS** BY ADRIAN DESMOND. COVERS ALL THE LATEST IN MESOZOIC MONSTERS.

### THE ECONOMY OF NATURE AND THE EVOLUTION OF SEX

BY M.T. GHISELIN. AN AMAZING BOOK! RIGHT-WING, CRANKY, AND DENSE, BUT ALSO WITTY, PROVOCATIVE, AND INFORMATIVE.

**THE REPRODUCTION OF LIFE**, BY R.L. LEHRMAN, IS A MORE EASY-GOING AND ELEMENTARY TREATMENT.

### ANCIENT PLANTS AND THE WORLD THEY LIVED IN

BY HENRY N. ANDREWS, JR. A BEAUTIFULLY WRITTEN AND ILLUSTRATED BOOK BY A FOSSIL FERN ENTHUSIAST. ONE OF MY FAVORITES.

### THE AGE OF MAMMALS

BY BJORN KURTEN. HE'S NO COLBERT, BUT NOT BAD.

**MAMMALS**, BY THE TIME-LIFE PUBLISHING EMPIRE. GOOD PIX.

### HISTORY OF THE PRIMATES

BY W.E. LEGROS CLARK. IF YOU'VE EVER WONDERED HOW YOUR TEETH DIFFER FROM A GORILLA'S, THIS BOOK WILL TELL YOU.

NOW, IF YOU'LL EXCUSE ME, I'M GOING TO REST UP FOR VOLUME 2!





I PRESENT HISTORY  
AS IT REALLY HAPPENED:  
IN CARTOON FORMAT!

**NEXT! Volume 2 of**  
**THE CARTOON HISTORY OF THE UNIVERSE:**

# “STICKS AND STONES”

THE EVOLUTION OF HUMAN BEINGS

**SEE!**

THE MASTERY OF  
TOOLS



**SEE!**

DOMESTICATION  
OF THE DOG



**SEE!**

THE INVENTION OF  
AGRICULTURE



PLUS: NEANDERTHAL BURIALS, CRO-MAGNON CARTOONING, THE USE OF FIRE, CANNIBALISM, RELIGION, THE FIRST CITIES, POTTERY, WEAVING, WAR, AND MUCH, MUCH MORE!! “DON’T MISS IT.” — KIM STAPLEY, AMATEUR THINKER

**COMING SOON FROM RIP OFF PRESS**

